THE ENGINEERING AND MINING JOURNAL AND COAL

CANADIAN SUPPLEMENT.

APRIL 20, 1901.

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We have once more to acknowledge the receipt of encouraging letters from Canadian correspondents, and to thank them for their kind words. We would like also to say to our readers that they can assist us materially in the work of making the mineral resources of Canada known to the world, by sending us news, notes, descriptions of mines and mining districts, accounts of new machinery and other matters of interest to the mining world. We should also appreciate photographs and drawings, where they can appropriately be used. We are sure that many of our readers can send us valuable notes, if they will; and such work will be of great service to themselves and to all our readers.

THE MINERAL PRODUCTION OF CANADA.

On another page we reproduce the statement of the mineral production of Canada in 1900, as prepared by the Statistical Section of the Geological Survey. It shows a large and encouraging increase in the total values, which were last year over six times the total reached 15 years ago, in 1886. A large part of the increase—especially that recorded since 1896—is due to the discoveries of gold in the Canadian Yukon and the production of the precious metal from that district; but apart from that, there has been a steady gain in other products of the mineral industry. The notable instances are found in copper, lead and nickel among the metals, and in coal, cement and building materials among the non-metallic products.

The total value of the mineral production of Canada for 15 years past has been as follows:

1900	$63,775,090	1895	$20,639,964	1890	$16,763,353
1899	49,584,027	1894	19,931,158	1889	14,013,913
1898	38,697,021	1893	20,035,082	1888	12,518,894
1897	28,661,439	1892	16,628,417	1887	11,321,331
1896	22,584,513	1891	18,976,616	1886	10,221,255

If we compare the year 1900 with the preceding year, we find that the total value of the mineral product increased by a little over 28 per cent., 12 per cent. of which must be credited to the enlarged output of the Yukon gold; 9.6 per cent. to increases in other metals, and 6 per cent. to the increase in the aggregate value of the non-metallic products, the value of the structural materials and clay products showing only a slight growth over past years. Compared with 1894, when the steady increase began, the total mineral production of 1900 improved nearly 320 per cent., and since 1886, when the first figures are available, over 600 per cent.

The value per capita of the mineral income of the community based on an estimate of the population amounts to $11.84, as compared with about $8.90 in 1899 and $2.23 in 1886. The per capita production in the United States for last year is estimated at a little over $15. The metal mining industries of the country lead all other classes, contributing 63.27 per cent., the non-metallic accounting for 26.38 per cent., and the structural class being credited with nearly 10 per cent. If, however, the Yukon placer gold be excepted as a special feature, the metallic and non-metallic products other than structural materials stand nearly on an equal footing.

If we examine the figures of the table, we find that the two more important items were gold, which formed 43.8 per cent. of the total and coal, which, with coke, was 20.9 per cent. Nickel, copper, lead and silver made up 18.6 per cent. of the total. Iron ore and pig iron, though comparatively small items in 1900, will show a very large increase in the current year. The products mentioned furnished 83.3 per cent. of the total.

The report for 1900 is encouraging and gives every indication of a continued increase in the mineral output of the Dominion.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials will only be published when so requested.

Letters should be addressed to the MANAGING EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The British Columbia Copper Company's Smelter.

Sir: In your issue of the "Engineering and Mining Journal" for March 30th I gave the tonnage of our 42 by 150-in. blast furnace for a week, running on ore crushed rather fine (1 to 2½ in.) for blast furnace work. Since then I have got the proper size of crusher cone for our No. 5 Gates crusher, and have now the same material crushed to sizes of 4 to 5 in., and I therefore give you the tonnage of one week's run on this material to show the great difference the size of the material has to do with the tonnage of a furnace. The amount of blast has been the same all the time, 155 revolutions of a No. 7½ Connersville blower. On April 1st the ore smelted was 402 tons; April 2d, 382 tons; April 3d, 363 tons; April 4th, 384 tons; April 5th, 393 tons; April 6th, 393 tons; April 7th, 402 tons; total, 2,701 tons, giving a daily average of 386 tons smelted. On the 3d, furnace was down one hour, fixing belt on engine.

Paul Johnson.

Greenwood, B. C., April 8, 1901.

The Ash Rapids Gold Mining Company.

Sir: The Ash Rapids Company, capitalized at $25,000,000, has been organized to acquire the holdings of the Boulder Mining Company, which comprise the Boulder Mine and two undeveloped prospects, S. 342 and J. C. 82, all being situated in the Lake of the Woods District in Ontario. The prospectus of this company is filled from cover to cover with the grossest misrepresentations. The facts are these. The Boulder has a shaft 300 ft. deep, with levels at 100 ft. There was a fair vein for 50 ft. from the surface, but below that there is no ore at present exposed of workable value. In the prospectus are the following statements about the Boulder Mine: "From development work already accomplished we know that there is more ore on the Boulder property than we will be able to mine in the next 500 years." . . . "There are thousands of tons of ore on the dump, and all that is needed to make this property an immediate producer is a stamp mill, which we propose erecting next mill season." . . . "This mill will be only a starter. We have enough ore in sight to keep 1,000 stamps busy continuously for the next 100 years."

The absurdity of such statements should be apparent to all. With regard to S. 342, called the Ash Rapids Claim, the prospectus makes me say in an extract from an alleged report: "The vein contact and formation are identical in every respect with the famous Mikado, and in fact the vein may be easily traced in a continuous line from the Mikado to the Ash Rapids property." I wish to state distinctly that I have never seen nor reported on this property, and that I never made such a statement. Since the Ash Rapids is situated over 6 miles at right angles to the line of strike of the Mikado Vein, the absurdity of claiming the Ash Rapids as an extension of the Mikado is sufficiently obvious. The third claim, J. C. 82, is a totally undeveloped prospect on Sturgeon Lake, about which nothing is known.

As I am slated as mining superintendent for this outfit, I may say without my knowledge or consent, I consider that I have a right to warn my friends who may be induced by my apparent endorsement of this project to invest their money in the enterprise. Hence this letter.

Charles Brent.

Rat Portage, Ont., April 3, 1901.

FIRE-RESISTING WOOD.—Sixty years ago Faraday experimented with, among other chemicals, sulphate of lime, sulphate of magnesia, borax and tungstate of soda, for treating wood to resist fire, none being entirely satisfactory, it being necessary to find a substance which, besides its fire-resisting qualities, would not absorb moisture nor corrode metals, and be comparatively cheap. The chief ingredients now used in the fireproofing solution are ammonium sulphate and phosphate, some firms adding a little borax or zinc sulphate. The usual method of impregnation is to run the timber into a horizontal cylinder capable of withstanding high pressure, and subjecting the wood to heat and steam for a time depending on its nature. The steam is afterward blown off and a vacuum maintained for two or three hours. The solution is then drawn in and a pressure of, say, 300 lbs. per square inch applied for a period which also depends on the nature of the timber. The load is then withdrawn and transferred to the drying room. Details of practice vary, however.

MINERAL INDUSTRY OF BRITISH COLUMBIA.

Written for the Engineering and Mining Journal by W. M. Brewer.

(Continued from page 391, Canadian Supplement for March.)

Slocan.

In this district are included the well-known silver-lead mines, many of which have paid large dividends during the last few years. At one time during 1897 there were 35 shipping mines in the district. During 1899 labor troubles occurred in the district, owing, it was alleged, to the passage of the Eight-Hour Act and the refusal of the mine owners to comply with the demand on the miners for 10 hours' pay for 8 hours' work. During the past year these labor troubles have been practically settled, and many of the mines which were idle have been again actively operated.

The total shipment of ore from the Slocan District for 1899 was $1,740,372, the number of tons shipped being 21,507. It is impossible at the present time to make any very reliable estimate of the shipment during the past year, but from the best information the writer can gather they amounted to 36,260,265 lbs. up to the end of October.

The output of the White Water Mine in the Ainsworth Division of the Nelson District is included in these figures. The principle shippers from the Slocan District are the Last Chance, Payne, Slocan Star, Rambler-Cariboo, Ruth, Noble Five, Cork, Bismarck, Trade Dollar and Mountain Consolidated.

It is impossible in a review of this description to discuss in detail the geology and workings of the mines in each individual district. There are certain typical features which occur in a greater or less extent in the majority of the mines in the Slocan. These are described in detail in reports by Dr. Dawson, of the Dominion Geological Survey, as well as in some of the reports of the Minister of Mines for the Province. From present indications it would appear as though the Slocan District is entering upon another period of prosperity, after experiencing a period of comparative inactivity during the year 1899 and a portion of the year 1900.

Vernon.

This district comprises the territory contiguous to Okanogan Lake. The chief town of the district is Vernon, near the head of the lake, reached by a branch line from Sicamous Junction on the main line of the Canadian Pacific Railway. But comparatively little is known of the possibilities of the district on the outside; a considerable number of mineral claims, many of which are reported to carry free milling gold ores, have been staked. On most of these the development work has been limited in extent, and until better means of transportation are afforded between the lake and the interior of the district its progress must necessarily be slow. At the present time no really reliable estimate can be formed of the future possibilities of the district.

Boundary.

During the past year this district has progressed at a much more rapid rate than at any time since the discoveries of ore were made. This condition is owing to the fact of the completion of the Crows' Nest Pass Railway to Greenwood, which has enabled mine operators to erect smelters and commence the treatment of the extensive deposits of copper-gold ores found within its boundaries. The construction of this branch of the Canadian Pacific system has resulted in placing the Crows' Nest Pass coke within easy access of the smelters at Grand Forks and Greenwood.

The mineral resources of the district are not confined to copper-gold ores, because in the Osoyoos Division are located the Cariboo-Camp McKinney mines, the Fontenoy, Stemwinder, Smuggler, Waterloo and other claims which have produced free milling ores. The Cariboo-Camp McKinney Company has paid dividends amounting to $478,087, the total production of bullion being $821,100. The mines of this company are the most completely equipped in the division, and have been the most thoroughly developed. The main vertical shaft has been sunk to a depth of 360 ft. and the total done in addition to the main shaft is 5,265 lin. ft. Of this 525 ft. represent air shafts and upraises; 210 ft. cross-cuts, and the balance drifting. It is reported that 68 per cent. of the total amalgam is saved inside the battery and the balance on the plates. The mill is furnished with a Wilfley concentrating table and two Johnson concentrators. The concentrates yield an average of about $1,500 net per month. The ore is a bluish quartz carrying pyrites, galena, sphalerite and free gold.

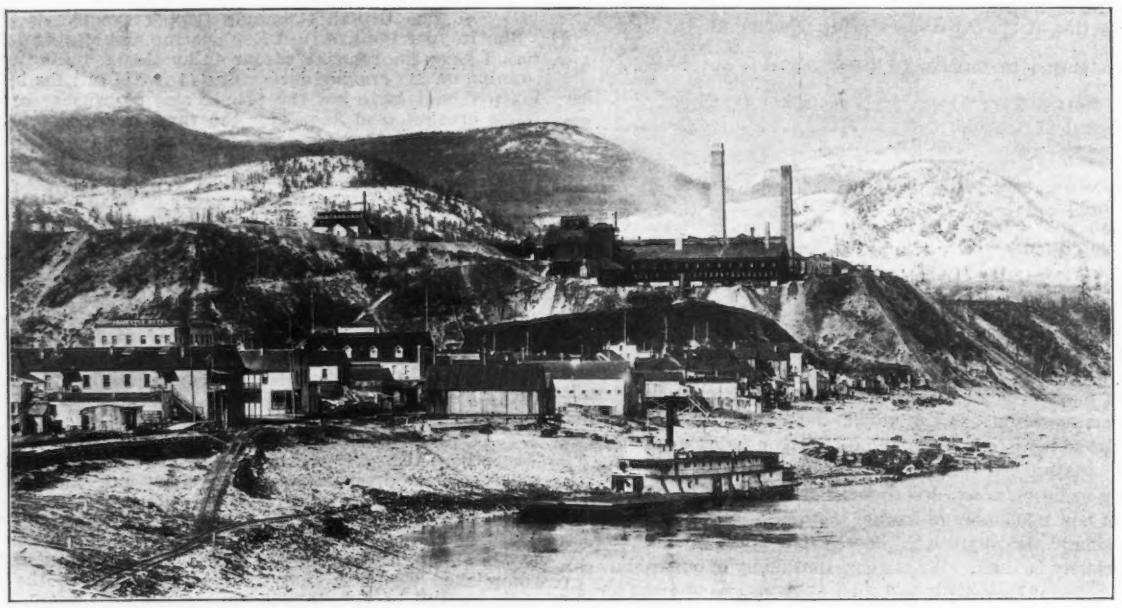
The Osoyoos Division of this district is at present remote from railroad transportation, the nearest railroad point being Greenwood, the terminus of the Crows' Nest Pass.

The most prominent of the smelter propositions in the Boundary District are the Old Ironsides and Knob Hill group, the B. C. and the Mother Lode. The Boundary District was described in detail in the "Canadian Supplement" for March.

Probably the most prominent feature of the Grand Forks and Kettle River Divisions of the Boundary District is the large extent of the ore bodies, which have been undergoing development for some years past. The low grade, though, which renders shipment to outside smelters prohibitive, and the lack of railroad transportation have retarded the progress of the district. Judging from the present shipments it would appear as though within a comparatively short time this district will be the largest producer of copper matte in the Province.

Nelson.

During the past year the mines which have attracted the most attention in this district are the Athabasca, Mollie Gibson, White Water and the property of Halls' Mines, Limited, on Toad Mountain. Of these the Athabasca and White Water have been the only producers during the past year.



THE TRAIL SMELTER, BRITISH COLUMBIA.

Recently the first ordinary general meeting of the shareholders of the Athabasca Gold Mine, Limited, was held in London, and the chairman's report read at that meeting contains the following important information relative to the operations of the company since taking over the mine June 1st: During June, July and August there were crushed 1,305 tons of ore, which yielded 3,116 oz. of gold of the value of $62,000; the cost of production was $30,000, leaving a profit of $32,000 for the three months' operations. From this profit an interim dividend was paid of $25,000.

With regard to the mine itself, the Athabasca vein is a narrow one, but exceedingly rich. A general assay made from the mine recently yielded $52.50 in gold per ton. The vein is at the contact between schist and granite, but at some little depth from the surface dipped from the contact into the granite. The vein was followed into the granite and the manager reports that in his judgment there need be no fear but that the vein maintains its continuity in the granite, but up to the present time the material facts necessary to determine the real value have not been proven.

With regard to the White Water Mine, a very complete report was made to the shareholders in November last by Mr. Fowler, the consulting engineer, in which he gives the product of the mine, from March 24th, 1898, to August 31st, 1900, at 53,445 tons, from which were obtained 4,803 tons concentrates, the average assay being 85.5 oz. silver and 87.3 per cent. lead. The total returns were $200,064. At the latter date the surveys showed total drifting of 2,275 ft., of which 285 ft. only had been done since June 1st, 1899, the mine having been shut down from that date to March 1st, 1900. With regard to the general result of the development of the mine, Mr. Fowler says that although there has been almost continuously clean galena and mill feed, the average thickness is less than was the case in the earlier history of the mine. The following comparison is made: From October, 1895, to March 4th, 1898, the area stoped was 75,700 sq. ft.; tons of product, 7,709, averaging 98 oz. silver and 30 per cent. lead, and yielded $44 per ton. From the latter date to September 1st, 1900, areas stoped, 75,500 sq. ft.; product, 4,803 tons averaging 85 oz. silver and 37 per cent. lead and yielding $38.75 per

ton, but of this only 3,745 came from the stopes, the balance having been derived from treatment of old dumps.

It is expected that shipments from the Mollie Gibson Mine will commence immediately, as the tramway is completed and all necessary arrangements for shipping made. The reports from this property are to the effect that it promises to be one of the best producers, as regards quantity and value, in the district.

Of Hall's Mines, there is but little to review at the present time. A reconstruction of the company was made some months ago, and money subscribed for further prospecting the Silver King Mine below the levels which were worked out previous to reconstruction. The smelter owned by this company has been running since the reconstruction of the company on custom ores and it is reported that the results have been very satisfactory.

Of the other mines in the district, the Ymir, situated on the north fork of Wild Horse Creek, is at present one of the most promising. The vein has been opened up to a vertical depth of about 600 ft. and it is reported that there is approximately 1½ miles of development, giving over two years' supply of ore in sight for the 80-stamp mill. This mill is connected with the mine by Hallidie tram, 2,400 ft. in length, with a drop of 650 ft. to the crusher floor.

A geological survey of the Nelson District was made during the summer of 1897 by R. G. McConnell, of the Dominion Survey. His report was published in the Minister of Mines' report of the Province for 1899. The district, although one of the oldest in the Province, has hardly yet reached its maturity. A large number of prospects have not been developed to any extent, and a considerable area has hardly yet been scratched by the prospector.

Rossland.

This district still maintains its supremacy, as the banner ore producer of the Province; the estimated output for 1900 is about 225,000 tons, as against 172,665 tons for 1899. The Le Roi, Center Star, War Eagle and Iron Mask are still the main producers, but during the past year there has been added to this list, the Le Roi No. 2, Giant, I. X. L., Evening Star, Monte Christo, Iron Colt and Spitzee. The Velvet Mine on Sophie Mountain has been brought into prominence during 1900, because of the satisfactory results from extensive development work performed during the year. The prospects are that this mine will be a continuous producer in the future of a higher grade ore than is usual in the Rossland District. It is reported that the assay value of the ore at the 300-ft. level is $82 per ton. The conditions with regard to the occurrence of the ore deposits and geology of the Rossland District have been thoroughly discussed since the discovery of the camp.

The additional machinery erected by the Le Roi, War Eagle and Center Star companies during 1899 and 1900 has of course aided the progress and prosperity of the camp. One of the most important features connected with mining in the Rossland District is the greatly reduced cost of reduction and treatment of the ores. The Center Star Company reports a reduction of 30 per cent. in cost, and the conditions prevailing in the camp are such that the cost of mining, shipping and treatment has been reduced possibly to the lowest notch. For this reason large quantities of ore which under the old conditions could not have been mined and treated satisfactorily will to-day yield a profit.

The Canadian Smelting Company's Trail Smelter has been remodelled and added to until its capacity is by far the largest in the Province. Connected as it is with the Canadian Pacific Railway it has advantages with regard to the purchase of ores from distant mines.

The metallurgical practice at this smelter is thoroughly up to date and the reductions made in the cost of treatment of ores during the past two years have been such as enable many mine owners to ship a grade of ore which two years ago could not have been mined satisfactorily.

(To be continued.)

THE MINERAL PRODUCTION OF NOVA SCOTIA.

The report of Mr. E. Gilpin, Jr., Inspector of Mines of Nova Scotia, for the year ending September 30th, 1900, gives the mineral production of the Province for two years past as follows:

	1899.	1900.	Changes.
Gold .....Oz.	27,772	30,399	I. 2,627
Iron ore .....Long tons	16,169	15,507	D. 662
Manganese ore ..... " "	100	8	D. 92
Coal raised ..... " "	2,642,333	3,238,245	I. 595,912
Coke made ..... " "	55,484	62,000	I. 6,516
Gypsum ..... " "	140,000	122,281	D. 17,719
Grindstones, etc. .....Value	$50,000	$56,500	I. $6,500
Limestone .....Long tons	32,000	50,000	I. 18,000
Barytes ..... " "	335	783	I. 448
Tripoli and Silica..... " "	893	1,100	I. 207
Copper ore ..... " "	400	600	I. 200

Regarding the production of the different metals and minerals some interesting details are given in the report. A summary of that portion relating to coal will be found in another column. Regarding other minerals, notes will be found below.

Gold.—The reports from the gold mines show for 1900 a total of 65,744 tons of ore mined and crushed, the total yield being 30,399 oz. gold; an average of 0.46 oz. to the ton. At $19 per ounce, the average value of Nova Scotia bullion, the production was equivalent to $577,581, or $8.74 per ton. No special changes in the gold-mining industry are reported during the year.

Copper Ore.—During the past season there has been no work calling for special reference. In Cape Breton County work was practically suspended on the Coxheath areas, but considerable prospecting was done by Mr. W. N. Young and others in the district between Sydney and Louisburg. Additional work was done at Polson's Lake and at Lochaber, in the county of Pictou, confirming the opinions already expressed that workable deposits are found there. In Pictou County the Copper Crown Mining Company started the furnace at Pictou, but as the working was not satisfactory it has been determined to remodel it. Work was continued for part of the summer at the mines, and about 650 tons extracted, about half of which is reported from 4 to 8 per cent., and the balance 12 to 15 per cent. of copper.

Iron Ore.—During the past year some attention has been paid to testing the more prominent deposits. The Torbrook ores in Annapolis County have received a good deal of attention. A large bed from 6 to 10 ft. in thickness has been traced from Black River, near the county line westward, and, passing a short distance south of the Leckie lead, is believed to represent the well-known shell bed. Several other beds of workable dimensions have been opened along the horizon represented by this bed over a distance of between five and six miles. The ores run from 48 to 55 per cent. of metallic iron. Late in the fall the 5-in. core calyx drill belonging to the Provincial Government was secured, and the bed drilled through at a depth of 300 ft. beside the Torbrook Road. At this depth the bed was about 9 ft. thick. Arrangements are being made to move the drill about 1½ miles to the westward, and there to test the bed at a depth of 500 ft. This drill has been working in an almost vertical hard slate and quartzite, and has given satisfactory results. These explorations have shown a wonderful regularity in the measures at Torbrook, and there is no doubt of a large amount of ore in the properties tested. At Arisaig, in Antigonish County, a large number of deposits of red hematite have been prospected to a limited extent. Analyses are said to show iron contents from 49 to 65.5 per cent., phosphorus from 0.212 to 0.530 per cent. At Whycocomagh pits and trenches have proved the extension of iron ore on the property of the Cape Breton Iron Company for a distance of nearly 2 miles. Previous reports have stated that a number of beds had been opened in this district. The additional work done this year has been on a bed of very good quality, running from 5 to 7 ft. in thickness. It is to be desired that this locality should at an early date be thoroughly prospected. The deposits here are very large and of good quality.

Barytes.—Messrs. Henderson and Potts worked their mine at Cape Rouge, Inverness County, and mined about 800 tons of a high grade ore.

Manganese.—Practically no work was done last year.

Tripoli.—The Bass River Company continued working. The Truro exports show 910 tons, valued at $18,684. The Victoria Tripolite Company, operating at St. Ann's, has got under way and made large sales during the past year.

Oil.—Borings have been continued during the summer in the vicinity of Lake Ainslie, but as yet, so far as is known, without success.

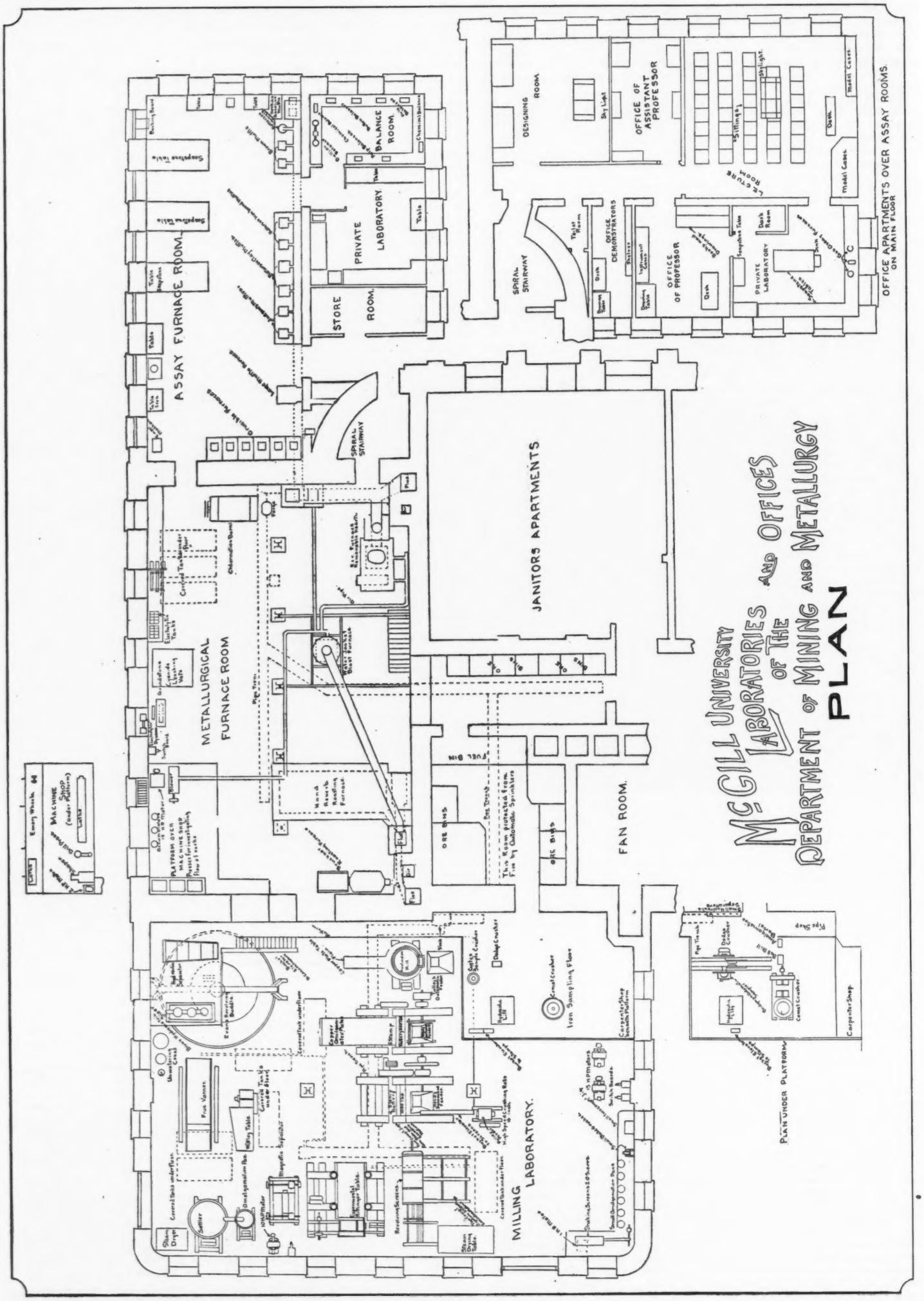
Plaster.—Work continued light at the various quarries, but an increased output is anticipated in 1901.

Lead.—During the summer the shafts of the Cheticamp Lead Company were deepened and new levels started to more effectually prove the deposit. Work will be continued during the winter. As the plant was not capable of concentrating to 50 per cent. galena, experiments have been in progress for some time, resulting in improvements. By crushing, sizing and concentrating on Wilfley tables, a very satisfactory separation is made of the pyrites and zinc blends, resulting in concentrates which find a ready sale. There has been a little prospecting work done in the district, and outcrops of lead and copper bearing veins have been reported from several points.

LABOR IN COAL MINES IN GREAT BRITAIN.—The Labor Report for 1900 says that the average time worked by coal miners in Great Britain in 1900 was 5.47 days per week. This compares with 5.46 days in 1899; 5.25 days in 1898; 5.13 days in 1897; and 4.92 days in 1896. The average for 1900 is the highest ever reported.

THE ONTARIO GOVERNMENT ASSAY OFFICE.—The laboratory report of the Ontario Government Assay Office located at Belleville and conducted by the Bureau of Mines for the assistance of prospectors and development of mineral lands, shows a total receipt of 53 samples sent in for examination during the month of March. The assays and analytical determinations aggregated 156, each checked off by a duplicate in order to avoid errors before issuing certificates. Of these 14 were for gold, 12 silver, 1 nickel, 1 copper, etc. Five samples of iron ores from different parts of Ontario were received for partial or complete examination as to smelting quality, on which 10 determinations were made. Twenty-five samples of raw and briquetted peat were received for analysis as to quality for fuel purposes, on which 70 determinations were made. The Bureau of Mines required 128 determinations on which no fees were collected, 28 being done for private parties. The custom work for the public is done at actual cost, fees collected from all this source amounting to $23. Six samples for identification, or report as to probable commercial value, as well as for qualitative examinations, were received, on which fees amounting to $2 were collected. No charge is made for such examinations on samples brought personally to the laboratory. The office supplies, free of charge, canvas shipping bags, and manilla mailing envelopes for small and crushed samples, to those requiring the use of such.

DOES MONAZITE OCCUR IN ONTARIO?—The bulletin of the Ontario Government assay office at Belleville discusses this question. Monazite is a mineral composed of numerous rare elements and has been but little known except by mineralogists till the last few years. It is commercially valuable at the present time, as it contains thorium, cerium, lanthanum and other rare elements, the oxides of which are employed in the manufacture of mantles, as in the Welsbach system of lighting. The present supply of monazite comes from North Carolina, where it is found in eruptive granitic rocks and as a heavy sand in low-lying gravels and river bottoms, which are being extensively worked over at a profit, using a system of concentrating by running water as in placer gold diggings. The beach sands on the coast of Brazil have also produced a considerable quantity. Monazite is reddish brown to yellow in color, usually forming beds of sand along with other heavy minerals, such as magnetite, gold, zircons, garnets, sphenes, corundum, ets. It is difficult to distinguish it from the minerals with which it is found, and may be passed over as of no value, as it may easily be mistaken for rusty quartz, corundum, sphenes, zircon, etc. Its hardness is 5 to 5.5 and can be scratched by ordinary red felspar or quartz. It has a resinous luster when pure. It is quite probable that this important mineral occurs in Ontario, as zircons are known to be widely distributed, especially in pegmatites and gneiss, also in mica and deposits in Eastern Ontario. Heavy sands found in river beds and shores of lakes may be worth investigation.

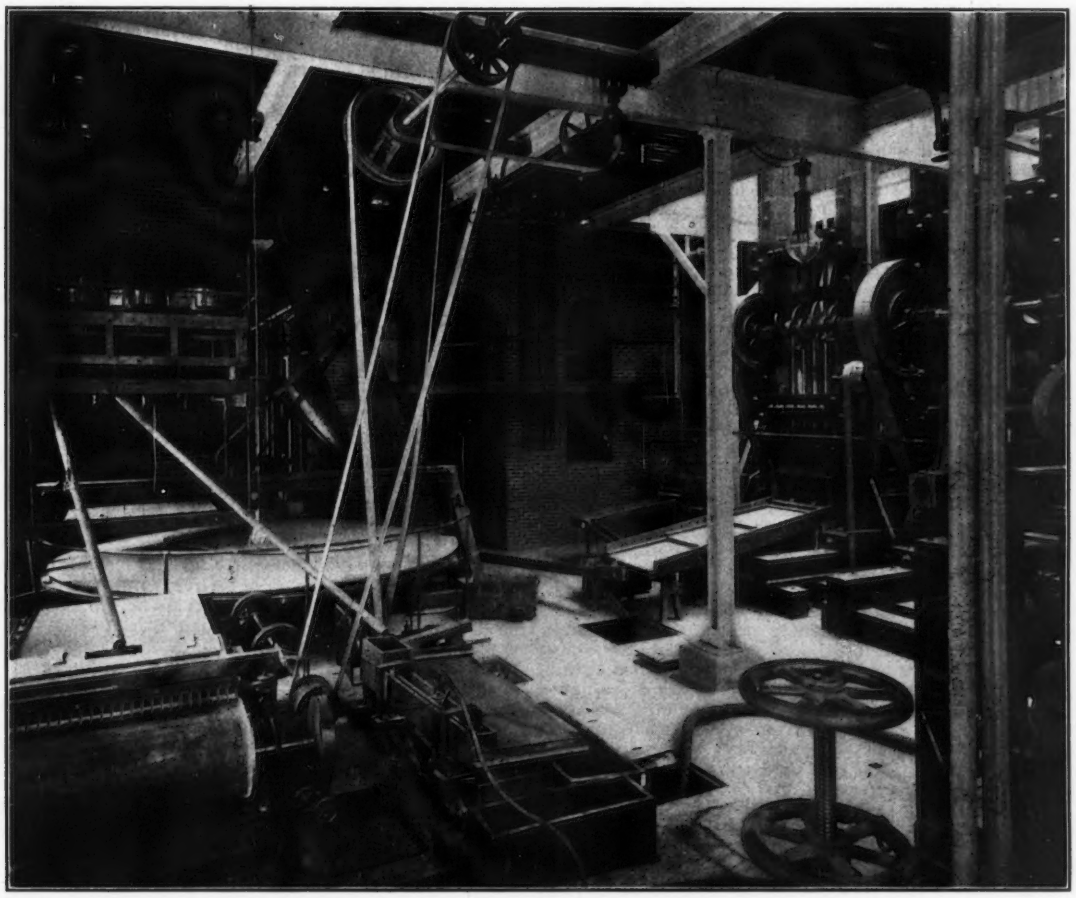

McGILL UNIVERSITY
LABORATORIES AND OFFICES
OF THE
DEPARTMENT OF MINING AND METALLURGY
PLAN
OFFICE APARTMENTS OVER ASSAY ROOMS ON MAIN FLOOR
DESIGNING ROOM
OFFICE OF ASSISTANT PROFESSOR
LECTURE ROOM
SPIRAL STAIRWAY
OFFICE DEMONSTRATORS
OFFICE OF PROFESSOR
PRIVATE LABORATORY
BALANCE ROOM
PRIVATE LABORATORY
STORE ROOM.
ASSAY FURNACE ROOM
SPIRAL STAIRWAY
JANITORS APARTMENTS
METALLURGICAL FURNACE ROOM
FUEL BIN
ORE BINS
FAN ROOM.
MILLING LABORATORY.
Iron Sampling Floor
PLAN UNDER PLATFORMS
MACHINE SHOP (under Platform)
PLATFORM OVER MACHINE SHOP
Carpenter Shop
Pipe Shop

THE DEPARTMENT OF MINING AND METALLURGY AT THE McGILL UNIVERSITY, MONTREAL.

Written for the Engineering and Mining Journal.

In 1867 Columbia University, in the city of New York, gave diplomas to the first graduates of its now famous School of Mines—the first mining school to be established in North America. A year later the Massachusetts Institute of Technology sent out its first mining engineer. Lehigh University followed in 1870, and next in 1873 came McGill, then, as now, the leading Canadian University.

Civil Engineering had been taught at McGill many years before, but without sufficient support to make the course very effective. In 1871, however, the principal, Sir William Dawson, succeeded in establishing a department of science with three full courses—chemistry, civil engineering and mining engineering. The first lectures in mining and metallurgy were given in the following year by Dr. Bernard J. Harrington, then an officer of the Canadian Geological Survey, but now, and for many years past, the senior professor in the McGill Faculty of Science and head of the departments of Chemistry and Mineralogy.



STAMP MILL, MINING DEPARTMENT, MCGILL UNIVERSITY.

The mining course found men ready and waiting for its advanced classes, and as already stated, its first degrees were given in 1873. Since then no year has passed without its mining class, and many of McGill's mining engineers have achieved notable success, not only in Canada and the United States, but in Africa, Australia, and South America.

For a number of years Science and Art lived under one roof, and made the best they could of quarters that grew each season more crowded. Minor additions to building and equipment were made from time to time, and in the case of one of these improvements it is interesting to note a gift in 1886 of the complete equipment of a chemical laboratory from Sir William Macdonald, the first of his gifts to science, and the beginning of a series that has made him first in the list of patrons of scientific education in Canada.

The Science Faculty, under its able dean, Dr. H. T. Bovey, and a constantly increasing corps of efficient professors, grew too fast for mere additions to the old buildings, and in 1891 and 1892 Sir William Macdonald provided most munificently for its future by the offer of two great buildings, one for engineering, the other for physical research. These buildings, which are now so widely known as to need no description, were finished two years later, and were given to the University, not only complete and magnificently equipped, but handsomely endowed.

A few years earlier the growth of the University had made it necessary for Dr. Harrington to give his whole time to his own special subjects, and a graduate of some years standing, Mr. Wm. A. Carlyle, now the chief engineer at the Rio Tinto Mines in Spain, was appointed lecturer in mining. He resigned during the session of 1895 to become mineralogist to the Government of British Columbia, and Mr. J. E. Hardman was appointed lecturer for the remainder of the session. In the meanwhile Sir William Macdonald had again come forward, this time in the especial interest of mining, by endowing a chair of mining and metallurgy, and soon afterward he began the erection of another building, perhaps the most magnificent of the three great structures that bear his name—the Macdonald Chemistry and Mining Building.

Dr. J. B. Porter, a graduate of the Columbia School of Mines, was appointed in 1896 professor of mining and metallurgy, and given a large fund for the equipment of this department. The building was completed in 1898, and its equipment, already begun, has proceeded until now it is practically finished. During these years the course in mining engineering had been gradually changed to meet the new conditions. The laboratories have now been in use for over a year, and the development of the department has proceeded far enough to justify us in describing it as it now stands, although still further improvements are contemplated.

The engineering courses at McGill all start out alike with one year of hard work at mathematics, descriptive geometry, physics and drawing, with a number of hours each week in manual work in the carpenter's shop, smithy and foundry.

The first year ends for the mining students, or rather the second begins, with a field school of one month given up exclusively to practical surveying. In the second year the mathematical and physical studies are continued, but differentiation has now begun and the miners give a good deal of attention to the chemical laboratory. They also do a good amount of drawing, and give some time to elementary work in the machine shop. At the end of this year a summer course in chemical laboratory work is offered, and is found very useful in preparing men for the following year.

The third year begins with another month of field work in surveying, after which the regular session begins. The mathematical work is concluded, and following it applied mechanics and graphic statics. The work in chemistry is continued, and geology and mineralogy are begun. In this year also the department of mechanical engineering gives courses in machine design and thermodynamics, and time is found for some very useful elementary work in the steam engine laboratory. The work of the mining department proper is chiefly reserved for the fourth year, but fire assaying, general metallurgy and the principles of ore dressing are given in the third year, and in the future it will be possible to include a number of days work in the elementary ore dressing laboratory.

Until the end of this year the course has been one in general engineering rather than mining, and the aim has been to ground the men thoroughly in the scientific principles which underlie all engineering work. With the end of the third year, however, the course changes.

In the vacation at the end of this year is held the summer school in mining, and the whole class is taken to some one of the important mining regions of Canada, or the United States, and systematic study is made of the mines, mills and furnaces visited.

The fourth year is one of considerable specialization. Mechanical engineering is continued—with especial reference to prime movers and power plants—hydraulics and hydraulic machinery are taught, and economic geology, ore deposits and petrography succeed geology and mineralogy. Mining engineering is now given a large amount of time, with

shorter parallel courses on power plants, mining machinery, railroad construction, and the ore dressing of the third year is followed by milling and amalgamation. The metallurgical work is of a similarly advanced sort, and includes copper, lead, iron and steel, with special courses on electro-metallurgy, pyrometry, etc. In this year the department laboratories are very much used. In the beginning of the session a few general demonstrations are given, but as soon as possible individual work is begun, each man being required to carry out one or two comparatively elaborate investigations on a fairly large scale. These experiments cover a wide range in ore dressing, milling, coal washing, metallurgy and electro-metallurgy; but the results of all are brought together at the end of the season by a system of student colloquia for the discussion of the work done. The final work of the course is the design in outline of a mining or metallurgical plant, often developed in connection with the practical laboratory tests referred to above.

To carry out so extensive a system of study has made necessary a large increase of the teaching force of the department, which now comprises—besides the professor of mining and metallurgy—an assistant professor of metallurgy, Mr. F. W. Draper, two demonstrators, and a number of mechanics and workmen.

The accompanying plan shows the general arrangement and much of the detail of the rooms and apparatus, and, taken with the photographs, is sufficient to give a fairly good idea of the scale of equipment. It may be of interest to state, however, that the laboratories, with lecture room, the professors' offices, and rooms for apparatus, supplies and fuel, are very conveniently arranged individually, and with regard to one another, and occupy the lower part of the main building and the whole of both wings. The total floor space covered is approximately 17,500 sq. ft., divided as follows: Ore dressing laboratory, or milling room, 4,500 sq. ft.; metallurgical laboratory or furnace room, 3,500 sq. ft.; assay laboratory, 2,500 sq. ft.; wet assaying rooms, 500 sq. ft.; departmental lecture room, 750 sq. ft.; drawing room, 750 sq. ft.; special laboratories, offices, stores, etc., 5,000 sq. ft.

The two rooms first mentioned are of great size and are the chief laboratories of the department. In these it is possible to take any ores of gold, silver, copper or lead in the condition in which they come from the mines, and to treat them from beginning to end almost exactly as they are treated in the ore dressing works and smelting plants of the mineral regions. They may therefore be considered as constituting a small working plant for the actual production of metals. They differ from commercial plants, however, in many and very important respects. An ordinary mill is designed to treat the ores of only one district or even of one mine, while the University laboratories must of course be adapted to the treatment of any ore now found or likely to be found in the Dominion, and therefore contain a more varied assortment, even of commercial apparatus, than will be found in one works. The essential difference is, however, that they are provided with a large number of machines especially designed for experimental work and for demonstrating and investigating the theoretical side of the subject.

The two main laboratories are very large and well lighted, and are each 20 ft. high in the clear, and close to them are the rooms for storage of ores, fuel, etc., from which clear, level passages lead to the elevators and connect with the crushers and furnaces. There are also several overhead hoists and travelers and a large number of trucks, wagons and portable tanks for carrying wet, dry or molten material from place to place. Material can therefore be moved from one point to another with the greatest ease, and pieces of apparatus can be readily taken apart, and, if necessary, moved by the same means.

It is not the purpose of the University to use these laboratories for commercial work, although they are quite as large as a small mill, and might be so used. They are solely for educational work and for investigation; and owing to their having both experimental apparatus and ordinary full-sized machinery the instruction given is of greater value than could be the case if the work were done only in miniature. At the same time test runs and investigations made by such means are of greater use to the mining community, as they are carried out under approximately working conditions, and are therefore free from the disturbing causes likely to interfere with attempts to reproduce commercial processes on a small scale.

The ore dressing and milling laboratory is equipped with a complete working plant capable of treating, if necessary, 10 to 20 tons of ore per day, the chief pieces of apparatus being rock crushers of three kinds, Blake, Dodge and Comet stamp mills of 600 and 950 lbs., respectively; Huntington mill of 3½ ft.; high-speed steel rolls, 16 by 10 in.; Gates sample grinder, and a small ball mill.

Following these crushers there is a Bridgeman automatic sampler, a large cylindrical trommel with 3 fields, a power shaking screen with 25 sets, and a complete assortment of hand sieves There are two specially designed jigs arranged so that adjustable motions of eccentric, cam, and slide type can be used with either two, four or six compartments; also several small hand and power jigs and Evans table, an adjustable Rittinger table, with glass surface for experimental work, a Frue vanner and a Wilfley table. There are also a number of spitzkasten, spitslutten and unwatering cones, and a large number of special tubs, washers, etc.

The machinery above mentioned is not in miniature; it is of full size, but is so made as to permit of adjustment for experimental work, and is so arranged that each piece can be worked by itself and taken apart and cleaned up; and such of the larger pieces as cannot be used for small quantities of material are duplicated in miniature by working models for handling small lots of material. An hydraulic lift and a complete series of belt and bucket elevators, samplers, etc., are provided for use in heavy continuous work. The laboratory, while thus adapted to do work on a comparatively large scale, is even more perfectly designed for experimental work on as small a scale as is compatible with accuracy of result. The motive power used is electricity, generated in the University power and light station, and utilized through a number of electric motors conveniently placed near the machines to be operated. The department is equipped with the most approved apparatus for electrical measurements, and is thus able to make constant and accurate determination of the amount of power used by each machine, and for any special condition of use.

The furnace room is fitted with a water-jacket blast furnace, 24 in. inside diameter, with the necessary blast apparatus for smelting lead and copper; also with a hand reverberatory furnace, a Bruckner roasting furnace, an English cupellation furnace, and several crucible furnaces. It has also a lead-lined chlorination barrel for high pressures, with filter press, air pump, etc., and several small vats, barrels, etc., for the chlorination and leaching of silver and other ores; also both large and small cyanide extraction plants for gold ores.

In addition to the above, the laboratory has a specially designed low-voltage motor dynamo, for electro-metallurgical work, with the necessary accompaniment of tanks, vats and a good storage battery. It also has an electric furnace of considerable power and of wide range of adaptability.

The assaying laboratory is equipped with a large soft-coal assay furnace and with a complete set of small muffle and crucible furnaces, some admirable electric pyrometers of both the Le Chatelier-Tory and and charcoal. Connected with this are smaller rooms, one provided with pulp, bullion and assay balances, and others for parting and the other chemical work involved in the main operations.

In other rooms of the department there has recently been installed some very excellent apparatus for metallurgical research, including some admirable electric pyrometers of both the Le Chatellier-Tory and Callendar type; two Adams-Nicolson hydraulic presses for subjecting rock and metal to extreme stress for long periods of time, and a very complete microscope and photo-microscope equipment. There is also a calorimeter room with Mahler and other instruments, a photographic room, and two well-fitted analytic laboratories.

ABSTRACTS OF OFFICIAL REFORTS.

Consolidated Cariboo Hydraulic Mining Company, Limited, British Columbia.

This company's report for the year ending December 31st, 1900, shows receipts from gold bullion recovered, $350,086; stores account, profit, $3,060; total, $353,146. The charges were: Balance from previous year, debit, $49,209; operating expenses, $151,182; depreciation, $2,177; head office, $1,908; interest and guarantee account, $59,829; total, $264,305, leaving a profit balance of $88,841.

The report of Manager J. B. Hobson says: "The canals opened earlier than usual under the influence of the warm Chinook winds that prevailed during the last two weeks of March, and washing commenced on April 4th, about two weeks earlier than usual. The mine was operated 171 days and 13½ hours, with a quantity of water varying from 2,500 to 2,750 miner's inches. The season's mining operations were divided into three runs, as follows: Washing was commenced in Pit No. 1 on April 4th, and was continued for a period of 66 days 1½ hours, ending on July 1st. During the run 170,753 miner's inches of water was used to wash out 791,899 cu. yds. of gravel and top clay, from which was recovered 7,867 oz. gold, valued at $134,728, an average yield of about 17c. per cubic yard, and a daily product of $2,039. The duty of the water attained was 4.63 cu. yds. of gravel per miner's inch. Washing operations were confined mainly to the ground thrown down by the bank blasts exploded in August, 1899, and March, 1900. Both bank blasts included a large percentage of the clay and low-grade gravel lying on the southwest rim, east of Dancing Bill Gulch. The inclusion of so large a percentage of low-grade material explains the cause of the low average yield of 17c. per cubic yard.

"The second run commenced on July 2d, continued for a period of 68 days and 12 hours, and ended on September 30th. During the progress of the run 188,375 miner's inches of water were used to wash out 751,000 cu. yds. of gravel and top clay, from which was recovered 9,058 oz. gold, valued at $154,848, an average yield of 20.61c. per cubic yard, and a daily product of $226. The duty of the water attained during the run was 3.98 cu. yds. of gravel per miner's inch. After the whole of the gravel and clay disintegrated by the bank blasts was washed out, the run was continued to completion by undercutting and caving the main bank by force of the hydraulic streams. The breaking up of the large masses of indurated clay by hand, and the delay in the delivery of explosives required for the second bank blast, and to keep the pit clear of boulders, caused a serious loss of washing time, and explains the cause of the falling off of the duty of the water below that attained during the first run.

"The third and closing run of the season commenced on October 1st, continued for a period of 37 days, and ended on November 9th, when the low temperatures closed the canals and ended the season's washing operations. During the progress of the run 101,750 miner's inches of water were used to cave and wash out 301,039 cu. yds. of top clay and gravel, from which was recovered 3,544 oz. of gold, valued at $60,509, an average yield of 20.1c. per cubic yard, and a daily product of $1,635. The duty of the water attained was 2.95 cu. yds. per miner's inch. The hard freezing of the gravel and lumps of indurated clay during several periods of low temperature retarded the progress of the pit work, and explains the cause of a further falling off of the duty of the water. During the progress of the second and third runs about 5,940 cu. yds. of gravel were washed from the lower bench through the bed-rock cuts and sluice section No. 1. The product thereof was 320 oz. coarse gold and nuggets valued at $5,470, an average yield of about 92c. per cubic yard. This product is included in that of the second and third runs. Washing operations were confined entirely to Pit No. 1, so there is no washing to report for Pit No. 2, which is practically in the same condition as it was at the close of the season of 1899. . . .

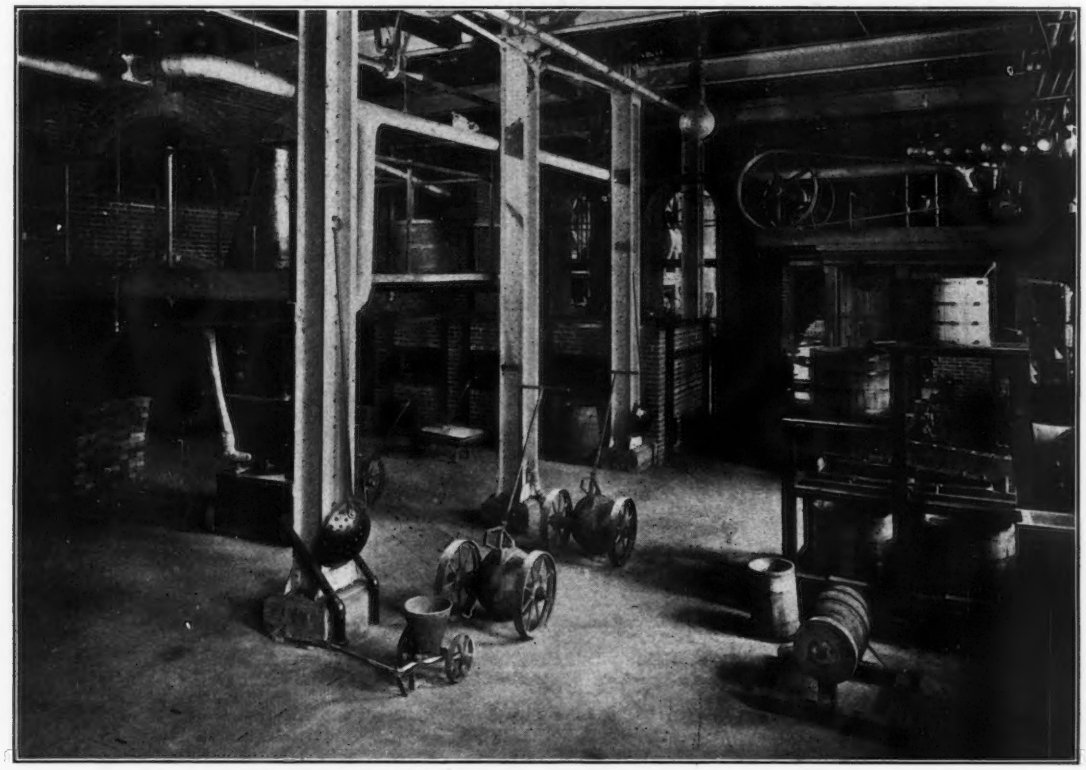
"The character of the deposits show a marked improvement as the workings are advanced up the channel. The heavy deposit of indurated clay overlying the gravel, on the southwest side of the channel, is decreasing rapidly. The pay gravel is increasing in depth in proportion to the decreasing in the thickness of the clay capping. The channel appears to be widening, and the average yield of gravel washed during

the season is a marked improvement on that of previous seasons. The gravel on the lower bench continues of high grade, and will probably improve as the workings are carried around the big bend and advanced up the channel. The gold-saving appliances are in good running order and prove efficient for the economical removal of the gravel to the dumps and the recovery of a high percentage of the gold. The portable hydraulic plant is in good working order, but requires an additional 1,000 ft. of 24-in. steel pipe for necessary extensions next season. Pit No. 1, with this addition to hydraulic plant, may be considered in good condition for the ensuing season's operations. A water supply equal to that of 1900 will assure a greatly increased gold product for the season of 1901. The operating expenses will vary as usual with the quantity of gravel washed and the difficulties encountered during the progress of the season's operations. Assuming that the clay capping will be successfully bank blasted and no accident occurs to interfere with the continuous operation of the mine, the operating expenses should not exceed about 6c. per cubic yard of gravel washed."

War Eagle Consolidated Mining and Development Company, B. C.

The annual report of this company, including the mine manager's yearly statement, has been published. Stock has been purchased in mining companies owning adjacent claims to the War Eagle for the sum of $165,000, and the company now controls the Monita, Mugwump and Rossland Red Mountain properties. Machinery and equipment are valued at $227,600. Stores on hand, $19,365, and the company's hotel is valued at $12,000.

The Bank of Toronto has loaned the company $255,608 and the president, George Gooderham, has advanced $351,462. The chief items in the profit and loss account are: Cost of mining and general expenses, $272,266; diamond drill prospecting, $20,598; legal expenses, $7,630; interest, $15,495. The net proceeds from ore sales were $74,431. But



FURNACE ROOM IN MINING DEPARTMENT, MCGILL UNIVERSITY.

one dividend of $26,250 was paid early in the year. From 1894 to December 31st, 1900 the mine has shipped 139,052 net tons, giving a net value after deducting direct and indirect smelter charges of $1,794,022. The direct charge amounted to $1,006,746 and the indirect to $755,976. These figures show why the company desires so very strongly to own its own reduction works or at least to come to some fresh agreement with the Canadian Pacific Smelter Company at Trail, where the output now goes. Only 9,886 tons of ore were shipped last year.

The report gives the expenses of the year as follows:

	Total.	Per ton.
Tons ore sold	9,886	.....
Working expenses	$43,130	$4.87
Development expenses	200,358	20.27
Totals	$243,488	$25.14

Mr. E. B. Kirby, the general manager, says that the past year has been devoted to the work of securing new equipment, of improving the efficiency of labor by the adoption of the contract system, and of advancing the development work. During the last portion of 1900 shaft sinking and the openings of new levels have progressed at a rate unequalled in the history of the district. The main shaft (February 1st) is down 1,307 ft., 80 ft. below the 9th level. The development during the year amounted to 4,428 ft., including the extension of the main shaft 355 ft. Ore shipments were resumed on January 4th, 1901. The estimated ore reserve is placed at 35,000 tons, averaging $14 per ton. The main ore shoot was practically continuous for 754 ft. and the 6th level was unusually rich. On the 7th level, however, two heavy faults and a large dike were encountered and the shoot apparently ceased. The manager adds: "Such interruptions in the ore bodies are characteristic of this ore shoot, and it is assumed that new bodies will be found lower down." Since the date of the report, February 1st, this has been accomplished.

The report is silent regarding the lower levels already reached, the only explaantion given being "that the exploration is not yet completed." Local mining men comment on this feature of the report.

Mr. Kirby concludes this portion of his report as follows: "Now that the machinery troubles are over, the mine well equipped, the speed of work doubled, radical economies effected in the costs of mining, and others expected in the costs of ore reduction; ordinary good fortune such as there is every reason to expect is all that is necessary to make the business successful."

The effect of the contract system is given as follows: "The average rate of advance has been increased from 31 ft. per month to 68.5 ft. per month. The cost for drilling, blasting, shovelling and timbering shows a reduction from $69.25 per foot of advance to $46.07 per foot. In drifting, the rate of advance of headings has been increased from the former average of 49.7 ft. per month during 1899 by the wages system, to 101 ft. per month by contract. The results of the new system have been equally satisfactory to the contractors, who have averaged good pay considerably above the standard rate of daily wages."

The main features of the mine equipment have been completed. They include a 200-H. P. steam geared hoist with accessory apparatus and a steam line connection with the center star boiler plant.

COAL MINING IN NOVA SCOTIA.

The report of Mr. E. Gilpin, Jr., Inspector of Mines of Nova Scotia, for the year ending September 30th, 1900, gives the total production of coal in the Province at 3,238,245 long tons, which compares with 2,642,333 tons in 1899; showing an increase last year of 595,912 tons, or 22.5 per cent.

The disposition of the coal mined in Nova Scotia in 1900 is reported as follows: Sales, 2,997,546 tons, or 92.6 per cent. of the total; consumed by workmen at collieries, 52,974 tons, or 1.6 per cent.; consumed for engines, etc., at collieries, 156,108 tons, or 4.9 per cent.; total, 3,206,628 tons; leaving 31,617 tons, or 0.9 per cent. as an addition to stocks.

The sales for two years past were made up as follows:

	1899.	1900.	Changes.
Nova Scotia	729,477	863,900	I. 134,423
New Brunswick	327,504	406,519	I. 79,015
Prince Edward's Island	66,881	68,103	I. 1,222
Quebec	1,029,288	934,229	D. 95,059
Total Canada	2,153,150	2,272,751	I. 119,601
Newfoundland	106,755	99,307	D. 7,448
West Indies	6,044	.....	D. 6,044
United States	153,188	624,273	I. 471,085
Other countries	.....	1,215	I. 1,215
Total exported	265,987	724,795	I. 458,808
Totals	2,419,137	2,997,546	I. 578,409

It will be seen that 75.8 per cent. of the sales in 1900 were made in the Dominion, against 89.0 per cent. in 1899. The large increase in coal sent to the United States was due chiefly to the operations of the New England Gas and Coke Company, which is using Nova Scotia coal at its plant near Boston.

The statement of persons employed in the coal mines in 1900 is as follows, the total number of days' work done being added:

	Skilled labor.	Laborers.	Boys.	Totals.	Day's work.
Underground	2,277	1,672	593	4,542	1,250,130
Surface	462	1,032	201	1,695	485,045
Construction work	79	307	3	389	19,536
Total	2,818	3,011	797	6,626	1,754,711

The average time worked was 265 days. There were 458 horses employed in the coal mines, 362 working underground, and 96 on the surface.

The Mines Department has records of the sales of coal in Nova Scotia from 1785 up to date. The total production by 10-year periods, has been as below, in tons:

1785 to 1790	14,349	1841 to 1850	1,533,798
1791 to 1800	51,048	1851 to 1860	2,399,319
1801 to 1810	70,452	1861 to 1870	4,927,339
1811 to 1820	91,527	1871 to 1880	7,317,430
1821 to 1830	140,820	1881 to 1890	13,910,136
1831 to 1840	839,954	1891 to 1900	20,552,536

The total, up to the close of 1900, was 20,552,336 tons. The sales of last year were the largest on record.

Some notes as to new developments in the Nova Scotia coal-fields are given in the report as follows:

"In Victoria County Messrs. Burchell have continued successfully their works at the New Campbellton Colliery. In the County of Inverness there has been a great deal of speculative interest, coupled with the commencement of systematic mining at several points. In the Chimney Corner District large tracts have been secured under lease and license. The presence of coal at Chimney Corner has been known for a long time, and a little mining was carried on a number of years ago. The outcrops of several seams are known about 3 miles to the westward, and others are reported on the height of land between the shore and the Margaree Valley. It is believed that systematic prospecting will show a large amount of coal.

"At Broad Cove work has been commenced by the Inverness & Richmond Colleries and Railway Company of Canada, Limited, to open a colliery a short distance north of McIsaac's Pond. The intention of the company is, it is reported, to win the seaward extension of the principal seams. It is reported that this company will control the areas of the Broad Cove Coal Company and all other territory covering the coal seams in this locality. A railway is now approaching completion from Broad Cove to Port Hastings. This road, it is expected, will be extended to Chimney Corner and Cheticamp, and will prove a most important factor in developing the iron, copper, lead, gold and other minerals of the northern portion of the island, as well as the coal.

"At Mabou Mr. R. P. Fraser and others have continued their development work, and anticipate that in addition to the coal available on the land they will have ready access to a large submarine area. At Port Hood the Port Hood Coal Mining Company has continued the development of its mine with satisfactory results, and expects next season to be ready for a regular output. They control a large territory in this locality, and report that the coal is well received. This section will also be served by the railway, and no doubt the coals of this side of the island will ultimately find a winter outlet at the Strait of Canso. In the Richmond coal fields little work has been done during the past season. It is reported that parties interested in building a railway from Hawkesbury to Louisburg are preparing for a systematic examination of the values of the coal seams known in this territory.

"Discoveries of coal have been reported from Harbor Bouche, Antigonish, Merigomish, Kennetcook and Portapique River, but little work has been done to determine their values."

GOLD MILLING PRACTICE AT THE ATHABASCA MINE, NELSON, B. C.*

By E. Nelson Fell.

The following notes may prove of interest, not on account of any especial features introduced into our process, but on account of the peculiar character of the ore treated. The general features are a hard blueish quartz, containing a large proportion of sulphides of zinc, lead and iron, showing free gold only when the ore is of fair grade, say from $30 per ton upward in gold values; and then usually closely associated with the lead and zinc sulphides. At times the entire ore body consists of solid sulphides, usually under these circumstances of either iron or zinc. We are not in the habit of making regular analyses of the ore, but in December we took a sample from the ore pulps of the mill runs of December 2d to December 15th inclusive. The ore at this period was what we call medium to low grade, and its contents were as follows: Gold, 1.35 oz. to the ton; silver, 45 oz.; zinc, 2.2 per cent; lead, 1.6; iron, 10.7; sulphur, 6; silica, 68.8; lime (CaO), 1.9; alumina, (Al_2O_3), 6 per cent.

In general the ore may be described as high grade, as the average gold contents recovered in the mill, during last year, was over 1½ oz. per ton and during the month of June reached very nearly 3 oz. per ton. A peculiar feature of the ore, and one which no doubt materially assists recovery in the mill is the free gold which is found imbedded in the zinc and lead sulphides, in samples where no sign of quartz is visible.

The mill contains 10 stamps, working in two batteries of 5 stamps each. The frame is of the front knee type. The battery posts are 12 by 25½ in., the knee frames are 12 by 17 in. and the girts are 12 by 13½ in. The whole is bolted together in the usual way and these dimensions seem to secure perfect solidity. The cam shaft is of steel, 5¾ in. in diameter, fitted for Blanton cams. Ours are arranged in the order of drop 1, 3, 5, 2, 4, and while this plan does not seem suitable to our case, we are unable to experiment with any other style without a new cam shaft. I think it would be an improvement if, in sending out these shafts, the manufacturers should drill them for the wedges, so that the order of drop could be changed. We find that the pulp banks up around No. 1 stamp and this both impedes the action of this stamp and interferes with the amalgamation in this end of the mortar. With a view to overcoming this difficulty our practice is to give the end stamp about ½ in. more drop than the middle stamps. The cam shaft works in open boxes, a system which we have proved to be thoroughly satisfactory. The guides are individual guides of maple with the grain of the wood up and down. Each guide block is held together by two ⅜-in. bolts running across the grain of the wood, with head and nut countersunk. Each pair of guides is held in place by two ⅞-in. bolts running through the guide rail. A hardwood wedge is driven home between each end pair of guides and the battery posts, and secured by a bolt. These guides give excellent service, if care is taken to have the guide blocks thoroughly seasoned before fitting; the cost of renewal is very slight, and they have the inherent advantage of all sectional guides.

The cams and tappets are of steel; the latter are fitted with three keys; after 24 months' wear we have not yet had occasion to turn one tappet, and the cams show no sign of wear; they work smoothly and consume practically no grease. The stems are of steel and we have not yet, after 26 months' use, had occasion to even turn one of these. The bosses or heads are of cast iron, and the shoes and dies are of forged steel. The stamp when new weighs 980 lbs. and the speed varies

ASSAY ROOM, MINING DEPARTMENT, MCGILL UNIVERSITY.

* Paper read at the Montreal meeting of the Canadian Mining Institute.

from 80 to 115 blows per minute, according to the requirements of the time, with a drop of from 5 to 8 in.

Under these conditions the mill has made a good running record. We stop on the first day of each month to clean up the amalgam in the mortars, lace belts and so forth, which stoppages aggregated last year, 8 days 17 hours; besides these delays we lost 4 days and 20 hours. Our motive power is entirely water, working under a head of 398 ft. We employ two impact wheels, one being a motor 2 ft. in diameter, which operates the stamps, the rock breaker, the electric light plant and the cyanide plant, and the other being a 12-in. motor which operates the vanners only, and of which the speed is never changed. The mortars were supplied by Messrs. Fraser & Chalmers and are described in their list as No. 50. The width of the mortar at the point of discharge is 14½ in. The height from the top of the die (when new) to the bottom of the screen discharge is 6½ in. and the die is 6½ in. deep. When the die is worn out, the height of the discharge is as much as 11 or 11½ in. The screens are of the diagonal slot pattern, and our practice is to employ a 50-mesh screen when the dies are new, a 40-mesh screen after 30 days' wear and a 30-mesh screen when the dies are wearing low. It is evident that a mortar arranged on these lines is not designed to attain high records of crushing, and the greatest tonnage which we have put through was during the month of January, 1899, when we crushed 713 tons in 30 days, 7 hours, or 2 1/3 tons per stamp per day. The pulp after passing over the plates is sized in a cone sizer and passes in grades of size to four Frue vanners; the first or coarsest grade passing over a 4-ft. corrugated belt and the other three grades passing over 6-ft. plain belts. The tailings from the vanners have, up to the present time, received no further treatment, but from this time forward will be treated in the cyanide plant.

The copper plates are arranged as follows: 1 back plate inside the mortar, 10½ by 5½ in.; 1 chock block plate inside the mortar, 3¾ by 50 in.; 1 lip plate outside the mortar, 8 by 54 in.; 1 apron plate outside, 56 by 120 in. All are electroplated with 1½ oz. silver to the foot. The apron plate has a fall of 1½ in. to the foot and just sufficient water is kept flowing over it to keep the pulp from banking on the plate. The practice is to dress the apron and the lip plates five times in each 24 hours, using as a cleansing solution a warm solution of dilute cyanide and sulphuric acid; the plates are brushed up with a hair scrubbing brush and smoothed off with whisk brooms, brushed across the plates. Fresh quicksilver is applied before the brushing process in quantity as may be necessary. In this way the plates are preserved beautifully soft and clean. The amalgam is removed every two days from the apron plates, a small piece of rubber being used as a scraper for this purpose. Every sixth day the screens are removed, the lip plates are cleaned of amalgam, and all of the trash and chips are cleaned out of the mortars; but the chock block plate, and the back plate inside the mortar, are only removed and cleaned at the general clean-up on the first day of each month. The amalgam is cleaned with fresh quicksilver and squeezed as dry as possible. In this condition the amalgam from the plates outside the mortars contains about 20 per cent. bullion and the amalgam from the plates inside the mortars from 30 to 45 per cent. bullion.

At least four assays are made daily: 1. Of the ore at the feeders. 2. Of the pulp as it leaves the late plate. 3. Of the tailings. 4. Of the concentrates. The sample taken at the feeders cannot be considered a satisfactory sample, but, averaged over a period of several days, the results are fairly good. For the year 1900 the average of the feeder samples was $44.38; tailings, $8.71. The theoretical recovery was $35.67 and the actual, $33.66.

The theory under which we have been working is that the gold should be given as early and as ample an opportunity as possible to amalgamate, and for this reason we have held to the use of as large plates inside the mortar as possible. For this reason, and in order to preserve the back plate intact, we do not alter the height of the chock block which carries the front inside plate, and in this way the level of discharge is always the same. In this way there is very little tendency to scour the plates, excepting (to a limited extent) around stamp No. 1 where the pulp is banked up by the action of the stamps; and the change of screens, as aforesaid, offsets the increasing height of discharge which is produced by the wear of the dies. After the run of the month of June, we cleaned off the plates inside the mortars, 3,183 oz. of amalgam, which produced about 925 oz. of bullion, or 64 per cent. of all the bullion recovered. During this month our percentage of recovery was 81 per cent. of the value of the ore. My opinion is that our loss consists almost entirely in the sulphide, and that our loss in amalgamable gold is slight. From June until the end of the year our percentage of recovery steadily fell to 77.6 per cent. in November, corresponding with the proportion of bullion and concentrates recovered.

Month.	Total amount recovered. Per cent.	Percentage by value of concentrates to bullion. Per cent.
June	81.0	21.5
July	80.7	24.0
August	79.6	29.2
September	79.4	27.8
October	78.4	29.7
November	77.6	38.7

In order to endeavor to ascertain what proportion of sulphates were being lost, we sampled and analyzed our ore pulps during December, as before described. During this period 280 tons of ore were milled, producing 26.7 tons concentrates, which, when sampled, assayed as follows: Gold, 2.67 oz. per ton; silver, 6 oz.; zinc, 5.5 per cent.; lead, 4.8; iron, 34.3; insoluble, 17.6 per cent. Actual results show losses in zinc of 74 per cent.; in lead, 67 per cent.; in iron, 65 per cent. The absolute accuracy of these figures is open to question, but I am satisfied that the general tenor of them agrees with our results in practice and they point to a serious need of additional concentration facilities. Our experiments, however, with the cyanide process for the retreatment of our tailings seemed to offer such excellent chances of success that we decided to instal a plant of this description, and did not further consider the improvement of our concentration plant.

Fineness of bullion varied during last year from 682.5 to 747.5, with an average for the year of 725.3. The fineness seemed to vary as the quantity increased, the bigger the brick, the higher the grade. It also seems to vary inversely with the proportion of concentrates recovered.

The number of tons crushed during the year was 5,054, which produced 520 tons concentrates or 10.2 per cent. by weight of the ore. The actual recovery in bullion was $25.62 and in concentrates $8.03 per ton; of the values recovered the bullion supplied 76 per cent. and the concentrates 24 per cent. The value of the tailings was $8.71 per ton and the percentage of recovery was 79.4. The tailings have been impounded in a dam pending the completion of the cyanide plant.

An iridescent brass-colored stain constantly forms on the apron plates. Fresh quicksilver when applied to the plate covered with this stain instantly adheres, as readily as though the plate were bright, and it does not seem to interfere with amalgamation in any way. It is instantly removed with the first stroke of the brush, and when the brushing process is ended I have seen the stain reappear within 15 seconds after the clean water has been turned on, before the attendant has time to release the first stamp. We have only made very slight investigation into the nature of this stain. Without more than suggesting that it has any connection with the above, I may here draw attention to the fact that while the iron sulphides are apparently entirely composed of common iron pyrites, FeS_2 = sulphur 53.3 and iron 46.7 per cent.; yet in the analyses of our ores and concentrates we seldom find more than from ½ to ¾ enough sulphur to satisfy the iron in the formula FeS_2, not to speak of the sulphur necessary to satisfy the zinc and the lead.

For melting the sponge we use a Braun gasoline furnace with one large burner. The size of the furnace is 10 in. in diameter and 12 in. high, measured inside. We make bricks weighing from 400 to 500 oz. each. We use a flux as follows: Borax glass, 100 gms.; bicarbonate soda, 50; glass, 600, and stir to excess with an iron rod. After skimming the slag, the brick is poured and is found in the mould with a heavy layer of matte on top. This is removed and the brick remelted under the same conditions. This process insures clean bricks in our case. The matte and slag are saved and, after the product of six months has accumulated, it is retreated in the pot with niter and litharge, and the resultant lead is cupelled. The residues are again treated in a similar manner, which second process removes all the value except traces of silver.

THE MINERAL PRODUCTION IN CANADA IN 1900.

As Reported by the Geological Survey of Canada.

		Quantity. (a)	Value. (a)
Product.—Metallic.			
Copper (b)	Lbs.	18,919,820	$3,063,119
Gold, Yukon	$22,275,000		
Gold, all other	5,441,752		
			27,916,752
*Pig iron	Tons.	35,387	583,158
Lead (c)	Lbs.	63,169,821	2,760,521
Nickel (d)	"	7,080,227	3,327,707
Silver (e)	Oz.	4,446,505	2,730,598
Zinc	Lbs.	212,800	9,342
Total metallic		.....	$40,391,197
Non-Metallic.			
Arsenic	Lbs.	606,000	22,725
Asbestos and asbestic	Tons.	30,641	763,431
Chromite	"	2,335	27,000
Coal	"	5,332,197	12,668,475
Coke (f)	"	157,134	649,140
Fire clay	"	1,245	4,130
Graphite	"	1,922	30,940
Grindstones	"	5,549	53,450
Gypsum	"	252,001	259,009
Limestone for flux	"	52,966	39,332
Mica	"	.....	166,000
Mineral pigments:			
Baryta	"	1,331	7,575
Ochers	"	1,966	15,398
Mineral water		.....	75,000
Natural gas (g)		.....	417,094
Petroleum (h)	Bbls.	710,498	1,151,007
Phosphate (apatite)	Tons.	1,415	7,105
Pyrites	"	40,031	155,164
Salt	"	62,055	279,458
Soapstone	"	420	1,365
Talc	"	1,000	5,000
Tripolite	"	336	1,950
Structural Materials and Clay Products.			
Cement, natural rock	Bbls.	125,428	99,994
Cement, Portland	"	283,124	545,826
Flagstones		.....	5,250
Granite		.....	80,000
Pottery		.....	200,000
Sewer pipe		.....	231,525
Slate		.....	12,100
Terra-cotta, pressed brick, etc		.....	259,450
Building material, including bricks, building stone, lime, sands and gravels, tiles, etc		.....	4,850,000
Total structural materials and clay products		.....	$6,284,145
Total all other non-metallic		.....	16,799,748
Total non-metallic		.....	$23,083,893
Total metallic		.....	40,391,197
Estimated value of mineral products not returned		.....	300,000
Total, 1900		.....	$63,775,090

*The total production of pig iron in Canada in 1900 from Canadian and foreign ores amounted to 96,575 tons, valued at $1,501,698, of which it is estimated 35,387 tons, valued at $583,158, should be attributed to Canadian ore and 61,188 tons, valued at $918,540, to the ore imported.

(a) Quantity or value of product marketed. The ton used is that of 2,000 lbs.
(b) Copper contents of ore, matte, etc., at 16.19 cents per lb.
(c) Lead contents of ores, etc., at 4.37 cents per lb.
(d) Nickel contents of ore, matte, etc., at 47 cents per lb.
(e) Silver contents of ore at 61.41 cents per oz.
(f) Oven coke, all the production of Nova Scotia and British Columbia.
(g) Gross return from sale of gas.
(h) Calculated from inspection returns at 100 gals. crude to 54 refined oil, and computed at $1.62 per bbl. of 35 imp. gals.

PERSONAL.

Mr. F. Darling, manager of the White Pass & Yukon Company's water lines, has been visiting Victoria, B. C.

Mr. S. C. McClure, who had charge of the Galena Mines at Silverton, B. C., is now in charge of the Watseca Mine in Montana.

Mr. H. Carmichael, provincial assayer of British Columbia, has been in Nelson, B. C., to conduct an examination there of those seeking assayer papers.

Mr. Byron C. Ribiet, tramway expert of Nelson, B. C., is now in South America to erect 3 tramways for the Andes Mining Company of Chimote, Peru.

Mr. T. A. Rickard, the well-known mining engineer, of Colorado, has gone to British Columbia on professional work, where he will be engaged for several weeks.

Mr. A. R. Ledoux and Mr. W. B. Devereux, of New York City, who have been engaged in a special examination of the Canadian Pacific Smelter at Trail, B. C., have finished their report.

Mr. Alex. Sharp, of Rossland, B. C., has been engaged with Mr. S. Spencer investigating coal lands in the Similkameen. Mr. Sharp is reported to represent a syndicate of Canadian Pacific officials.

Mr. Hiram Donkin, for many years resident manager of the Dominion Coal Company, Sydney, C. B., recently acquired by the Whitney syndicate, has resigned, and Mr. Christopher Shields, of Bristol, Va., general manager of the Virginia Coal and Iron Company, has been appointed to succeed him.

Mr. Cornelius Shields, receiver of the Virginia Iron, Coal and Coke Company, and vice-president and general manager of the Virginia & Southwestern Railway, has resigned both positions, effective April 20th, to accept the position of vice-president and general manager of the Dominion Coal Company, and Sydney & Louisburg Railway, headquarters at Sydney, Cape Breton Island.

SOCIETIES AND TECHNICAL SCHOOLS.

Engineers' Club, of Toronto.—At the March meeting an interesting account of the Algoma Commercial Company's operations at Sault Ste. Marie was given by T. J. Kennedy, the chief engineer of the works. At the meeting on April 2nd an account of engineering and surveying in the Yukon was given by L. B. Stewart, of the School of Practical Science, being reminiscences of his receent trip there.

Society of Engineering and Applied Sciences.—This society has been organized at London, Ont., to follow the lines laid down by the Engineers' Club of Toronto. The inaugural meeting was addressed by F. E. Leonard, Prof. Bowman, F. Henry, F. W. Farncombe, Prof. Harrison, F. W. Merchant, Dr. Wolverton, F. W. Matthews, Principal Kirk, Dr. Cl. T. Campbell and others. Officers were elected as follows: President, Prof. Bowman; vice-president, F. W. Merchant; secretary, F. W. Farncombe; treasurer, R. Kirkpatrick; organization committee, Messrs. Merchant, Hunt, Mitchell, Leonard, Bowman, Henry, Sifton, Campbell and A. W. White.

Toronto University.—The Ontario Legislature recently voted $200,000 for further equipment to the applied science departments of Toronto University and the School of Practical Science. Of this sum, $50,000 is to be advanced at once for a start on a new building, 3 or 4 stories high and several hundred feet deep, to make room for which the old technical school building is to be torn down. The design for this building will be open to the competition of Canadian architects; and when completed will be occupied by the departments of applied chemistry, geology, mining and metallurgy. It will be equipped with modern machinery and apparatus, and the transfer of the chemistry departments from the present School of Science building will leave room for the much-needed extensions and developments in the electrical and mechanical branches of the School of Science. Prof. Galbraith is to make a tour of investigation abroad to gather information on the equipment of applied science departments of other universities.

McGill University students in the department of mining have each summer held a summer mining school designed to give instruction in the relations of practical and theoretical mining. In previous years the eastern portions of the Dominion and the State of Pennsylvania have supplied the necessary training ground, but this year British Columbia will be visited. On their way to Vancouver the students and their professors will visit the anthracite mines east of the Rockies, and a day will be spent in the Selkirks in order to inspect the great glacier. On Vancouver Island a large part of a week will be devoted to the study of the coal mines near Nanaimo. The first point on the return trip will be to the Arrow Lakes on which the party will be transported in a steamer to Sandon and Slocan City, when the silver-lead camps will claim attention. Then Rossland and the Boundary Country will each receive a week's visit and the party will travel home via Nelson, stopping at several places in the East Kootenay mining districts, and at the coal mines near the Crow's Nest Pass.

It is expected that about 20 students will avail themselves of this opportunity to learn the mineral resources of the Dominion. They will be accompanied by Dr. J. B. Porter, professor of mining; Dr. F. D. Adams, professor of geology, and Mr. F. W. Draper, assistant professor of metallurgy. Each man receives a printed outline of the points to be observed in each class of mine and smelter visited. He must take full notes, measurements, etc., as he goes along, which are examined daily. As the train goes on informal lectures will be delivered upon the geological characteristics of the country through which it is traveling and the special features of the mines that are to be visited will be pointed out. At the end of the journey memoirs either upon the whole of the works visited or some portion in detail must be written by each student during the rest of the vacation.

INDUSTRIAL NOTES.

Evans, Coleman & Evans, Vancouver, B. C., are to erect large cement works at Mission City, B. C., at an estimated cost of $200,000. A marble quarrying and polishing plant will also be established at the same spot.

The Berlin Iron Bridge Company, of New York City, has contracted to furnish the Province of New Brunswick, Canada, 4 bridges. There will be required four 53-ft. riveted spans, one 150-ft. through pin connected span, one 200-ft. deck pin connected span and one 80-ft. deck pin connected span.

Mr. Harry Oldland, a well-known coke oven builder of the Connellsville, Pa., region, has been awarded the contract for building 400 ovens for the Crow's Nest Pass Coal Company at Fernie, B. C. A number of experienced Connellsville men will accompany him. The Dunbar Fire Brick Company has the contract for furnishing 1,000,000 brick.

The Canadian General Electric Company recently secured from the Land Security Company 30 acres of land at the crossing of the Northern and Canadian Pacific lines near Montreal and will erect extensive works thereon as an extension of the Canada Foundry Company, which the Canadian General Electric Company controls and operates. The Canadian General Electric Company's works at Peterboro and Montreal have hitherto been dependent for their castings upon various sources of supply, and that the new establishment will in the first place supply these castings and in the second place carry on a general engineering manufacturing business. Recently large additions have been made to the facilities of the Peterboro' main works, which occupy about 40 acres. The main machine shop there is some 600 ft. in length. Not long ago the Canadian General Electric Company acquired the manufacturing property of the Royal Electric Company of Montreal and are now operating these shops. The railway facilities are excellent and the company will equip the foundries upon a scale larger than anything now existing in Canada. Building is expected to start in the early summer and will probably continue for a year.

The first building will be the large general foundry, to be followed by the pipe foundry, for the manufacture of pipes, hydrants, valves and geenral water-works supplies, which the company are now making in the St. Lawrence Foundry. Then the company will erect machine shops, structural iron shops, blacksmith shops, patern shop, power house, etc. Railway tracks will run through each shop, and electric cranes will be provided for handling work up to 50 tons. All the machinery in the shops will be operated by electric motors. At present the company employs in Toronto, Peterboro' and Montreal from 1,200 to 1,500 men.

GENERAL MINING NEWS.

BRITISH COLUMBIA.

Atlin District.

Boulder Creek.—On this creek below Discovery E. Jaune de Lamare, of Paris, France, has bought out the lease holders and it is said that in company with M. Clere he will double the present hydraulic plant this year.

Boundary District.

Granby Smelter.—A. B. W. Hodges, superintendent of this smelter at Grand Forks, has returned, after a business trip extending from San Francisco to New York. Contracts for the additional plant have been awarded. The Gates Iron Works, of Chicago, which supplied the original plant, will furnish 2 new furnaces and the converting plant, and the electrical machinery will be furnished by the Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa. The delivery must be made within 90 days. The contract stipulates that the furnaces shall jointly treat a minimum of 600 tons daily, and the converters 100 tons of matte daily. A portion of the plant must be delivered within 30 days and the remainder within 90 days from the signing of the contract. The converter building will be of steel. The structural steel will fill 5 cars. The Westinghouse Company will supply the electrical machinery and incidental equipment. It will include another generator and a new water wheel. The power house will be enlarged so as to develop an additional 300 H. P. The company will be prepared to do custom work in our converter.

Lake Shore Copper Mining and Development Co.—John Dorsey, of Grand Forks, organized this company which recently acquired a working bond on the Blue Bell and J. S. claims, in Summit Camp. Development work on the Blue Bell is said to be progressing satisfactorily. The shaft is down 90 ft., the ore body at the bottom being 6 ft. wide. Thirty-seven sacks recently sent to the Granby Smelter gave a net return of $14.85 per ton. A plant will be installed shortly.

(From Our Special Correspondent.)

The Miner-Graves Syndicate intends to increase the size of its plant at Knob Hill, Old Ironsides and Victoria mines, by a 40-drill compressor and a hoist, capable of raising from a depth of 1,500 ft. These will be so arranged as to be run either by electricity or steam. The railroad spur, which has just been built to the back of the Old Ironsides shaft house, will greatly facilitate the delivery of wood and supplies.

Ore Shipments.—The ore shipped from the Knob Hill, Old Ironsides and Victoria Mines for the first 3 months of 1901 is as follows: January, 18,050 tons; February, 17,360 tons; March, 19,-208 tons; a total of 54,618 tons of gold-copper ore. The tonnage averaged 607 tons daily for the whole period. It is expected that in the early fall, when the additions to the Granby Smelter at Grand Forks, B. C., are completed, the shipments will be doubled.

Athelstan.—This mine, owned by the Athelstan Gold and Copper Mining Company, Limited, of Grand Forks, is situated about 3 miles from Phoenix, in what is known as Wellington Camp. The property is developed by 800 ft. of work, the main shaft being down 100 ft. The ore body is 30 ft. wide and has been drifted upon for 200 ft. without reaching its limits. During 1900 over 1,200 tons of gold-copper ore were shipped to the Trail Smelter, and in March, 1901, over 500 tons went to the Standard Pyritic Smelter at Boundary Falls. The company interested in the Standard Pyritic Smelter has a bond on this property for $150,000, good until April 22d, 1901.

Brooklyn.—The railroad spur to this mine is being cleared of snow and ballasted, to facilitate the delivery of the new plant of the Dominion Copper Company.

Snowshoe.—This group of 4 claims, situated about ⅛ mile from the city limits of Phoenix, is owned by the British Columbia (Rossland & Slocan) Syndicate, Limited, of London, Eng. The managing director is Anthony J. McMillan, of Rossland; consulting engineer, J. W. Astley, Rossland. Most of the work has been done on the Snowshoe, which is developed by both shaft and tunnel workings. The main incline shaft is down 200 ft. Crosscuts from the 100 and 200-ft. levels have shown up large bodies of ore of shipping grade. From the 200-ft. level a diamond drill hole has been put down 500 ft. A tunnel 600 ft. long is in pay ore. A 110-ft. winze sunk in this tunnel has shown the ore to be continuous and of shipping grade. The total amount of work done on the group is 4,000 ft., of which 1,000 ft. is in tunnel workings. From time to time some 20 cars of ore have been sent as smelter tests.

The surface plant consists of a 70-H. P. boiler, a 40-H. P. boiler, 2 Rand compressors, 4-drill and 7-drill respectively, an air receiver, 6 machine drills, 2 hoisting engines, a No. 5 Cameron sinking pump and a No. 4 duplex Snow station pump.

Winnipeg.—The company owning this mine in Wellington Camp, about 2 miles from Phoenix, has been reorganized upon an assessable basis. Assessments Nos. 4 and 5 have been levied. The development to date consists of 3,500 ft. of shafts, crosscuts, drifts, etc. The main shaft is down 300 ft. and from the 300 ft. level a winze has been sunk 150 ft. At 110 ft. down in this a vein 2 ft. wide was struck and now the vein is reported 20 ft. wide, with a streak of ore 11 ft. wide on the hanging wall. There are 5 veins on the property, of which 3 are expected to come together in the main shaft, 2 having already done so. Trial shipments from this third vein give satisfactory smelter returns. Nick Tregear, late superintendent of the Le Roi Mine at Rossland, has charge.

Caribou District.

Mica Deposits.—A syndicate of business men of Revelstoke has been formed to prospect for mica in the Big Bend District, about 180 miles north of Revelstoke. This company has located 2 full claims situated on the north side of Sand Creek, which enters the Fraser River about 2½ miles below Tete Jaune Cache. The vein is said to be in mica schist, about 15 ft. wide, and is traceable without difficulty along the entire length of the claims. It stands out conspicuously above the country rock, and has a streak of mica from 4 to 12 in. wide, which outcrops about 600 ft. above the creek. From this point surface samples were picked running from 7 in. square to 7 by 12, and of very fine quality. These claims are located on the same vein as the celebrated Bonanza mica claim, and lie across the gulch from it, separated only by the bed of the creek. In 1899 the Bonanza shipped 2 tons of merchantable mica, valued at about $25,000.

Dragon Creek.—Gust. Lange is working these mines near Stanley. He has on Dragon Creek about 15 men, on Coulter Creek about 10 men, and also expects to do some work on Otalla Creek. Mr. Lange has run 400 ft. of a gravel tunnel and has his mine well opened up.

East Kootenay District.

Crow's Nest Southern Railway.—The bill to authorize the construction of this road has caused considerable controversy at Ottawa. In this bill G. A. Cox, Elias Rogers, Henry M. Pellatt, J. W. Flavelle, E. R. Wood and A. E. Ames, all of Toronto, seek power to construct a line of railway from the gap near Canmore to Jenneys, in the United States, crossing the international boundary near Fernie, with a branch line to Lethbridge. There has been a strong opposition offered by the Canadian Pacific. It is reported that an amicable agreement had been arrived at, and that the Canadian Pacific had obtained all that it asked, namely, the guarantee as to the price of coal, and the promise of the patents for their share of the coal lands.

The supporters of the bill claimed that the Crow's Nest Pass Coal Company owned a large amount of land on the line, with the first rights of the Government of Canada to select 50,000 acres, and the right of the Canadian Pacific to 6 sections of one square mile each. The Coal Company has an almost inexhaustible supply of coal. The demand for coal in that district is not large, but there is a great but varying demand for coke made from coal. Last year for 3 months there was not a single ton of coke ordered.

The British Columbia demand is for 700 tons of coal and 300 of coke a day, making 1,000 a day. The proposed line connects with the Northwest Central. The coal, as long as it remains in the ground, is of no value, but only became so when converted into coke. The work of raising coal means an expenditure at the mines, as did the converting of it into coke. All this expenditure was made in Canada. Last year $446,000 was paid for wages; with a limited demand, 220,000 tons of coal were ordered, and 73,000 tons of coke; $500,000 was spent in Canada for supplies, and $190,000 in Great Britain and the United States. These figures did not include transportation. There are at present 330 coke ovens, and there was a demand for more. The royalty is 5c. a ton, and the tax 5c.

With the increased trade, which the construction of these lines meant, it is estimated that there will be an immediate demand for 1,000 tons of coke per diem, which would mean a larger amount of coal. The 350 ovens turned out 73,000 tons of coke. The present capacity of the ovens is 500 tons a day, and of coal about 1,800 tons a day. The present means of transport to the States is 320 miles, while the new line from the boundary would be 30 miles, and from the boundary to Jenneys 50 miles.

St. Eugene Consolidated.—A large part of the working force of this company's mines at Moyie have been discharged and the company is reported to have suspended work indefinitely. It is alleged by the management that the ruling prices for lead and silver do not justify them in continuing work, while the men say that the move is in accord with a prearranged scheme to force the government to bonus the refinery proposition. The St. Eugene, Lake Shore and Moyie, which are the mines immediately affected, have been worked in combine. There was about 3 days' work for the mill, when it, too, shut down, and the camp is reported practically dead. The output of the mines for March was about 3,200 tons. The best previous month's output was 3,040 tons.

Sullivan.—This mine has been shipping a few odd loads. On account of the poor condition of the wagon road from the mine to Kimberley. A tunnel has been driven in a considerable distance on this property a year or so ago, starting in the proximity of the bunk house, the intention being to drive for a distance of 300 ft. in order to tap the ore body at depth and to facilitate drainage, etc., and taking out ore. The tunnel was abandoned for the time being, but is to be started again.

(From Our Special Correspondent.)

Carbonate King.—Superintendent Olson, of the Carbonate King Mine, states that the property is looking beter than it has done any time heretofore. The tunnel is now in 120 ft. There is no question but that there is a large body of rich ore in the Carbonate King.

Mount Sicker & British Columbia Development Company.—This company recently shut down for a month on account of the melting snow, which has caused the workings to fill with water, giving them more work than they can handle. The showing was good when work stopped.

North Star.—This mine has been shipping regularly on an average of 60 tons per day.

Red Line.—This group on Horse Thief Creek, in the Windemere District, has been acquired by a New York syndicate and will be known as the McDonald Mines. The final payment on the $40,000 bond has been made.

Lillooet District.

On the south fork of Bridge River 40 men are at work, mostly Chinamen, at the Brown hydraulic mine and a good deal of work is being done, ditching having begun April 1st. Piping is expected to begin soon.

McGillivray Creek is showing up remarkably well and the mill is running regularly.

Ample.—At this mine on Cayoosh Creek 40 men are at work. The owners are reported confident of good results with the cyanide plant.

Lorne.—At this mine the timbers for the 5-stamp mill are all out and the machinery is on the ground.

Scum Scum.—This property is to be worked by an American, who will begin at once. A hydraulic plant may be put in.

West Kootenay District.

The ore shipments for the week ending April 13th are estimated at 8,049 tons, a falling off of 204 tons, as compared with the previous week. Le Roi increased its output by 194 tons, while Center Star showed a decrease of 312 tons. The gain for War Eagle was 45 tons in an output for the week of 750 tons. The shipments of Le Roi No. 2 were 1,008 tons. This is a decrease of 35 tons, as compared with the showing of the preceding week. The Rossland Great Western is maintaining its usual record of 800 tons. The tonnage treated at the Granby Smelter during the week was 4,350; tonnage treated to date 122,930. The shipments of the past week and year to date are approximately:

	Week.	Year.
Le Roi	4,009	56,116
Center Star	1,920	32,053
War Eagle	750	10,470
Le Roi No. 2	1,008	7,719
Rossland Great Western	300	3,038
Velvet	.....	563
Iron Mask	62	62
I. X. L.	.....	119
Evening Star	.....	76
Spitzee	.....	60
Giant	.....	52
Portland	.....	24
Totals	8,049	111,950

Miners' Union.—At the recent annual convention of the District Association, Western Federation of Miners, in Nelson, delegates were present from Nelson, Rossland, Boundary and East Kootenay.

James Wilkes, Nelson, president, was re-elected; Rupert Bulmer, Rossland, was elected vice-president; Alfred Parr, Ymir, secretary-treasurer, was re-elected. The association passed resolutions favoring a government refinery for treating silver-lead ores.

Slocan Lake Shipments.—Shipments of ore from Slocan Lake for 1899 totalled 3,078 tons. Shipments in 1900 totalled 4,930 tons. The shipments of ore from Slocan Lake points up to and including the week ending March 28th, 1901: From New Denver, Hartney, 120 tons; from Bosun Landing, Bosun, 180; from Silverton, Hewett, 520; from Enterprise Landing, Enterprise, 120; from Slocan City, Arlington, 840; Two Friends, 40; Black Prince, 60; Bondholder, 50; Chapleau, 15; Speculator, 20; total, 1,965 tons.

Big Four.—This group on Ymir Creek is under bond to the British Lion syndicate, an eastern Canadian incorporation. It has a wide ledge, carrying pay-streaks of galena ore.

Blue Bird.—An important strike is reported from this mine, owned by the Montana Gold Mining Company and located near Deer Park, on Lower Arrow Lake. A shaft had been sunk 100 ft., and a crosscut made at that depth for 155 ft. At this point the ledge was tapped and it has been cut for 11 ft. without encountering the hanging wall. The ore is said to be rich. The strike is called the most important that has been made along Lower Arrow Lake.

Center Star.—This Rossland mine is steadily shipping from the great stope on the second level. In the newer workings the showings on the 5th and 6th levels are reported quite up to anything in the mine.

Condor.—This group of claims near Silverton is a silver-lead proposition that last year was acquired by W. H. Sandiford for an English syndicate and considerable work has been done upon it. The company intends to develop the property this season.

Douglass-Hunter.—A strike of importance is reported on this property on Sophie Mountain, west of Rossland. In the lower tunnel, at 750 ft. in, good values have been obtained. The mine adjoins the Velvet and Portland groups.

Eldorado.—This claim, near Ymir, is owned by the Eldorado Mines, Limited, of Rossland. This group is traversed by a vein over 60 ft. wide, which contains numerous payshoots of sulphide ores. One shoot is 16 in. wide and carries galena, copper and lead, with gold and silver.

Emily Edith.—This mine at Silverton has shipped a car-load of galena ore to the Nelson Smelter—the first of the year. The mine is stated to be a concentrating proposition and enough ore is shown up by No. 4 tunnel to justify the erection of a mill.

Evening Star.—This mine at Rossland closed down April 8th on account of the condition of the roads and the likelihood of not being able to ship for the next 60 or 90 days. Mr. Chamberlain, who has been in charge of the work on the Evening Star since November 29th, 1899, when operations were resumed by the reorganization of the company, has stated that the last shipments made showed ore running $30 to the ton in gold.

Fisher Maiden.—This group of claims at Silverton will be worked by the Fisher Maiden-Tory Mines, Limited, with the following officers, all of Spokane, Wash.: John Hunner, president; Jules Prickett, secretary and treasurer; Frank Watson, manager. The group was originally located in 1893, and has had $35,000 expended upon it in development work. About 200 tons of ore have been shipped, giving smelter returns reported at from 225 to 350 oz. in silver to the ton.

Granite Gold Mines, Limited.—An extraordinary general meeting of this company is to be held in London, England, on May 6th. The company is to be voluntarily wound up, as it has been proved to the satisfaction of the directors that, by reason of its liabilities, it cannot continue its business successfully. William McEwen, a chartered accountant of London, is to be appointed liquidator. The company's property is situated on Eagle Creek, 6 miles southwest of Nelson, and includes several mineral claims in various stages of development.

Homestake.—The mine is being unwatered slowly. The upper workings are nearly clear and the work of up-raising the main shaft from the tunnel is in progress.

Le Roi.—The assembling of the second 40-Rand drill compressor is nearly completed at Le Roi. When in working order this will finish the improvements started two years ago and on which $400,000 has been expended. The erection of a third 40-drill compressor building and plant end on to the present outfit will be commenced in May.

Nevada.—This Ymir mine is owned by the American Eagle Gold Mining Company of Rossland. A shaft was sunk 40 ft. and disclosed good ore for the whole distance. The vein exposed for 500 ft. by ditches and trenches varies between 5 and 7 ft. wide. The No. 1 tunnel started 175 ft. below the shaft and was only driven 35 ft. No. 2 tunnel, about 200 ft. below No. 1, has been run 230 ft. in a direction which will bring it below the bottom of the shaft on the outcrop at 236 ft. in depth. An intermediate tunnel has been driven 85 ft. The Nevada ore is said to be similar to that of the Ymir Mine. The company intends erecting a concentrating plant during this summer.

New St. Elmo.—The south drift is in 400 ft. and the ledge is apparently of the same width. The north drift is in for 160. The vein has faulted and after passing through the fault for a distance of 20 or 30 ft. a cross-cut will be made to the south to catch the ledge.

Payne Mining Company.—The company recently decided to withhold the current quarterly dividend of 3% and do necessary development work.

Porcupine.—This Ymir group, one of the oldest locations in the district, was staked in 1893, before the section was opened up by the Nelson & Fort Sheppard Railway, and about 200 ft. of work was done by the original locators in the first 2 years of their ownership. Since then but little further development work has been done. The property has since been transferred to the North American Mining Company, but no further work has been done.

Scottish Canadian Mining and Development Company.—This company, organized by Mr. A. E. Welch, of London, Ont., is getting in good shape for pushing development work during the coming season. This company owns the Rob Roy group on Galena Creek, comprising 3,600 ft. of location on the Horne Ledge, just above Circle City, in Revelstoke Division. About 380 ft. of tunnel has been driven which shows up con-

siderable ore. The main tunnel is 300 ft. above the creek and will give 500 ft. of vertical depth. It is said that arrangements are being made with an English syndicate to take up sufficient treasury stock in the company to provide £20,000 for development purposes. The directors of the company are Dr. Treasdall, of London, president; T. A. Miller, Rossland, vice-president; A. E. Welch, London, managing director; Dr. S. Woolverton, J. P. McCormick, G. H. Westlake, C. M. R. Graham, W. E. Kough, W. H. Poole and J. H. Courtney, of London, Ont. The company has offices at London, Ont., and Rossland.

Silver Lake.—This Ymir group, owned by A. J. Hughes and Joseph Reviere, lies about ½ mile east of the Union Jack group. There are 3 claims in the group, upon which about 130 ft. of development work has been done by the locators.

Slocan Star.—This company has resumed work after a long shutdown. About 100 men are employed and ore shipments will start in May.

Union Jack.—This group of claims is in Porcupine Basin, about 7 miles from Ymir and is owned by Cameron, Goodlad and McLeod. It is traversed by 4 ledges, varying from 4 to 20 ft. wide. On one vein a shaft has been sunk 45 ft., and a tunnel run from the bottom 35 ft., following the ore, of which about 4 ft. is exposed. About 200 ft. from this shaft a tunnel has been run in on a vein between 5 and 6 ft. wide. Another vein, about 300 ft. from the first named, has been opened up in several places. A tunnel 100 ft. long has been run and it is expected that in another 60 ft. the payshoot of ore exposed on the surface above will be struck. About 800 ft. south of this ledge again a fourth vein has been exposed.

Velvet.—The compressor plant at this Rossland mine is running and the work of unwatering the mine to the 300-ft. level is under way. As soon as this is completed the intention is to deepen the shaft from the 300 to the 400-ft. level, and to open up on a more extensive scale the ore bodies on that level.

White Warrior Gold Mining Company.—This company, with its head office in Ferguson, and executive office in Lapeer, Mich., is a new company which is to work this season upon properties they acquired last fall. J. H. Bidwell, Lapeer, Mich., is the president of the company; W. B. Clarke, vice-president; Paul A. Cogwill, of Lapeer, secretary, and S. A. Lockwood, of Lapeer, the treasurer. The properties consist of 3 full-sized mineral claims, the Horse Shoe, White Warrior and Snowflake, covering possibly 150 acres. The claims are situated on the divide between Gainer Creek and the Little West Fork of Duncan River. The country rock is schists, slate and limestone.

(From Our Special Correspondent.)

Miners at Rossland have held several meeting recently. They wanted the muckers' pay made $3 per day in place of $2.50, and also asked that the walking delegate of the Union should be allowed to canvass the men on behalf of the union on the companies' ground, particularly at the dinner hour. Both requests were refused by the managers of the Le Roi, Centre Star, War Eagle, Le Roi No. 2, Rossland, Great Western and the Kootenay mines. The managers added that they were doing their best to pay the existing wages and that if there was any trouble the rate would be reduced. All the miners are making good wages in Rossland now and no further trouble is anticipated in labor circles this year.

Rossland Ore Output.—The March output from Rossland broke the record, the estimate being 38,500 tons. January corrected shipments show 30,894 tons, February 26,728 tons, a total for the first quarter of the current year of 96,322 tons. This exceeds the shipments of last year up to the end of July.

Canadian Gold Fields.—The company has announced the payment of its second dividend of 3%.

Le Roi Smelter.—The additions and improvements to the Le Roi smelter at Northport are concluded and 5 furnaces are at work. The ore shipments to this point from Rossland will be considerably increased when the smelter has caught up with the ore on hand during April.

Rossland Great Western Mines.—The new 40-drill electrical compressor supplied by the Rand Drill Company, of Sherbrooke, Que., has started work. The plant runs smoothly.

War Eagle.—The main shaft at the War Eagle has reached the 10th level at 1,378 ft. A station has been completed and further sinking resumed. The ore body which went out at one 7th level has been again encountered in the lower workings and satisfactory values are reported obtained. Further development is awaited. The manager is reticent and refuses to make any official statement on the subject. The electrical compressor was taken apart for reconstruction and the changes are now completed. The ore tramway has been improved and shipments now go over it to the railway.

NEWFOUNDLAND.

Contractor R. D. Reid has lodged with the Newfoundland Land Office claims for 1,000,000 acres, being the balance of lands unselected by him under his railway contract of 1898. By the terms of that deal he acquired a right to something over 4,000,000 acres, the selections to be completed within three years. Of this he had already selected three-fourths, the remainder being now pre-empted. Until the completion of his selection, the government could not grant to other parties any lands within 10 miles of the railway. It is said that the aggregate of Mr. Reid's grants makes him owner of just 1/7 of the usable area of the island—farm, timber and mining lands.

NORTHWEST TERRITORY.

Saskatchewan River.—According to a local paper Mr. Fernando Wadsworth, of Boston, Mass., has been inspecting placer properties along this river above Edmonton. There are said to be 2 dredges at work on the river, one owned by the company Mr. Wadsworth represents and the other by an English company. The gold is stated to be very fine, and the value in some of the bars is high.

NOVA SCOTIA.

Cape Breton.

Dominion Coal Company.—This company's coal shipments for March (the first month of its fiscal year) amounted to 120,200 tons, compared with 85,400 tons in March, 1900, an increase of 34,800 tons. The output for the month amounted to 192,000 tons. Shipments up the St. Lawrence River begin about May 1st and the company is preparing for a large summer business.

ONTARIO.

Grey & Bruce Oil and Gas Company, Limited.—This company, of Hepworth, Ont., has succeeded in securing oil and gas contracts covering about 10,000 acres of territory.

Hastings County.

Clarendon Mining Company.—This Detroit concern proposes to work a mine about 18 miles from Clarendon Station on the Kingston & Pembroke Railway. Four development shafts have been sunk, one to 175 ft. The directors are: George C. Wetherbee, Eber L. Kelsey, William M. Metcalf, Henry J. Boerth, William R. Hees, A. J. Groesbeck and William M. Courtis, of Detroit, with Col. D. S. Wagstaff as corresponding secretary.

Lake of the Woods District.

Big Master.—This company has been crosscutting toward the Noonan or small vein on its property during the past two months. The management reports that this vein has been struck at the 100-ft. level and shows quartz equal in richness to the surface showings. Sinking has been resumed in the shaft. The erection of the 10-stamp mill, of which the foundation was put in last fall, will go on at once.

Gold Bullion Mining Company.—This Buffalo, N. Y., concern, capitalized at $750,000, owns location 363P, about 3 miles northeast of Rat Portage. It is stated that a shaft will be sunk 300 ft. and that work will begin at once. Two carloads of machinery are already at the location.

Homestake.—A contract for 60 ft. of crosscutting on this claim near Rat Portage was given recently to Messrs. Derry & Banville. The 100-ft. crosscut at the 100-ft. level will be extended 30 ft. to intersect the Point vein.

Minerva Island.—This property, 8 miles southwest of Rat Portage, is reported to carry several veins of quartz from 2 to 20 ft. wide, showing gold values. The claim has an area of 50 acres and under water rights to 40 acres. It is owned by an American company.

Nish-She-Shin.—The Michigan Mining Company, of Detroit, Mich., has taken over this claim on Sturgeon Lake near the Gold Panner Mine, and is to begin work when navigation opens.

Reliance Mining Company.—This company, operating the Independence Mine in Manitou District, has begun the erection of a 10-stamp mill, which is already at the mine.

Virginia.—This company owns 490 acres of land and 200 acres of under water mining rights. The main shaft is down 200 ft. and is reported to show good values in gold. The property is to be reopened this spring.

Sudbury District.

Trill Mining and Manufacturing Company.—Justice Lount, at Toronto, has granted an order to wind up this company. The petitioner was Joseph Wharton, of Philadelphia. The company was incorporated in 1896 and began business in that year, mining and manufacturing nickel and other ores in the Township of Drury, in Algoma. It carried on extensive works for over 3 years and erected a complete mining and smelting plant, but in the end it proved profitless. Mr. Wharton is a creditor of the company for $14,000. As it was hopelessly insolvent, the present steps were taken. The National Trust Company of Toronto was appointed interim liquidator.

CANADIAN IRON TRADE REVIEW.

Montreal. April 16

(From Our Special Correspondent.)

We are favored with a strong market in sympathy with the United States. Local papers are beginning to talk about the prospective competition of our new furnaces when they are in operation. This, however, is in the future as yet. Much interest has been aroused in the 5-year contract for steel rails taken by Mr. Clergue's Sault Ste Marie Steel Company for the Intercolonial Railway. There will be 125,000 tons of 80-lb. steel rails, to be delivered in yearly lots of 25,000 tons each. The price for the first year's quantity was placed at $32.60 delivered a ton, the succeeding 4 years' prices to be based on the prevailing English market.

The price of $32.60 is the same as the contract made by the Canadian Government with the Illinois Steel Company and the Cambria Steel Company for the 1901 supplies. The Clergue Company's contract will begin next year.

We quote No. 1 foundry pig iron as follows: Summerlee, $20@$21 per ton, spring delivery; Hamilton, Sydney and Midland, $18@$19. Bar iron, $1.50@$1.60; steel bars, $2.25. No. 1 wrought scrap iron, $14@$16. Tin plates, cokes, $3.50@$3.75; charcoal, $4@$4.25. Canada plates, $2.70@$2.75. Galvanized iron plates, $4.15@$4.25. Terne plates, $7.50@$8. Sheet iron, $2.85 for No. 26; galvanized sheets, $4.25@$4.50 for No. 28. Machinery round and square steel, $3.25.

MINING STOCKS.

Full quotations of the Toronto and Montreal Exchanges will be found on page 507.

Apr. 16.

(From Our Special Correspondent.)

A month shows little alteration in the mining stock market, as the public is still slow in placing investment orders. No doubt the reason for this is found in the fact that some of our stocks are quoted too high, representing as they do heavily capitalized companies whose producing property is limited. Of late, however, the declining market has taken much of the water out of these shares, and we all hope that in the near future trading will be on a more substantial basis. Of course there are some valuable properties on the market, but these shares are apt to be closely held.

At this season annual meetings are in order, and some interesting facts are learned by stockholders. Owing to more systematic development work, fewer dividends are being declared, but it is expected that the increased production will favor the stockholders in the near future.

At the Payne Mine in British Columbia the directors decided to pass the quarterly dividend, wishing to keep the cash reserve around $125,000, so as to prosecute development work. This company paid in January a $78,000 or 3c. per share dividend, which is at the rate of 12% per annum. To that date it declared $1,438,000, which is equal to over 55% on its issued capital stock of $2,600,000.

The big Granby smelter amalgamation is now in working order, and the capital stock is $12,000,000. The shares show few transactions, as they are offered sparingly.

Princess Maud, of British Columbia, has levied its 32d assessment of 1 mill a share.

The Golden Star two assessments have yielded about $19,000 to date, while the total is expected to reach $21,000. Consequently the company has resumed work on its property.

The subscriptions to the Dominion Iron and Steel preference stock were very large. The president states that the distribution was as follows: To 900 applications for 25 shares each or under, 10,086 shares; to 563 applicants for over 25 shares, each 25 shares, 14,075 shares; to holders of common stock, 5,914 shares; total, 30,075. In order to give the smaller applicants as many shares as possible all the large holders of common stock waived their rights to their proportion of the preference shares. To cover the excess of allotment, 75 shares were purchased in the market.

The petroleum excitement in the United States has turned attention again to the Gaspe oilfield in Quebec, and it is said work is to be resumed. It may be remembered that a few years ago three English companies, the Petroleum Oil Trust, the Canada Petroleum Company and the Irish Proprietary Company undertook the development of the district, but litigation resulted, and subsequently the Petroleum Oil Trust absorbed the other two companies. It is claimed that the Petroleum Oil Trust has expended fully $3,000,000 in the field. The new scheme is to promote an export trade with Great Britain besides furnishing the local consumption.

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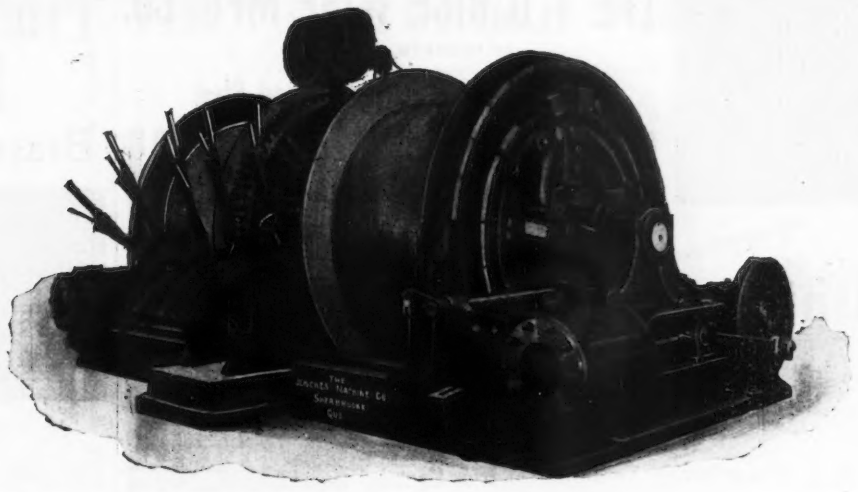

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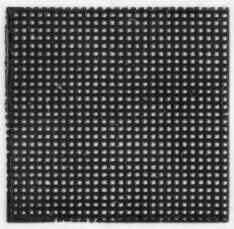

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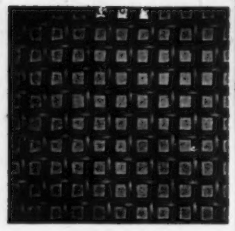

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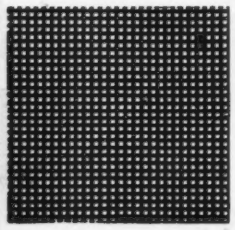

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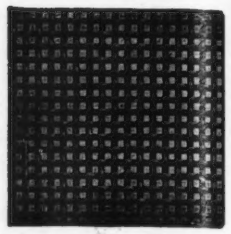

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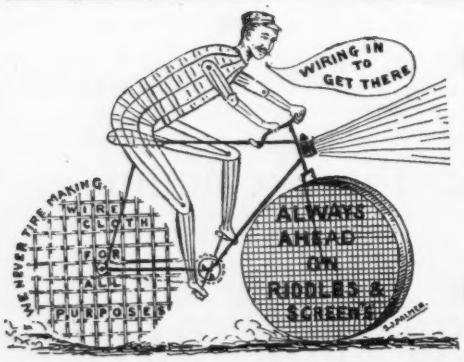

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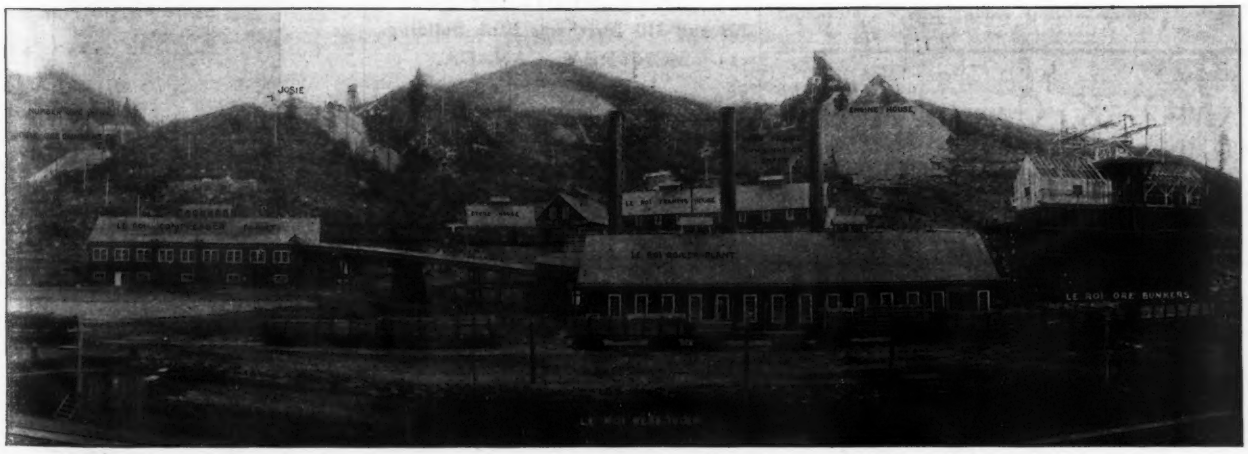

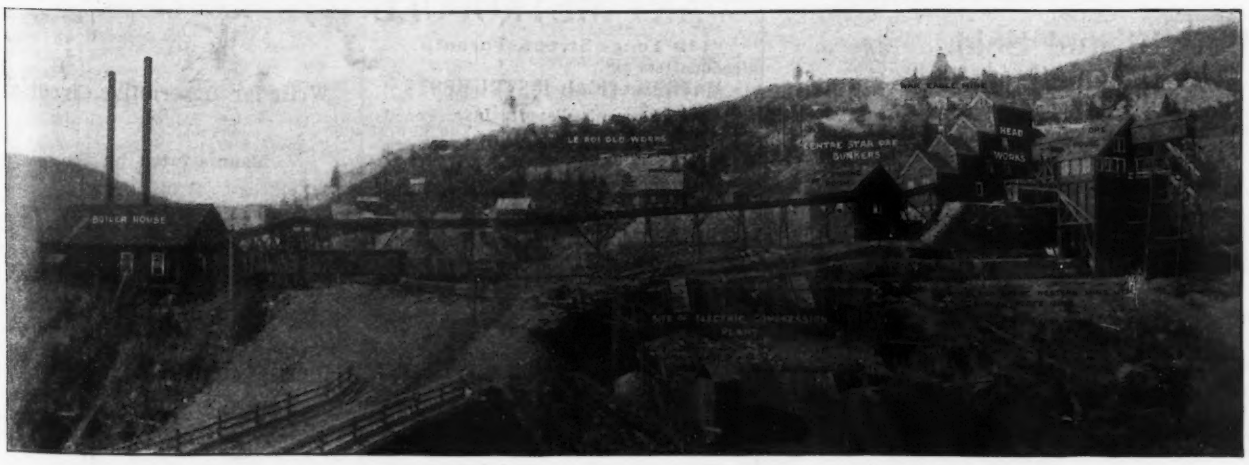

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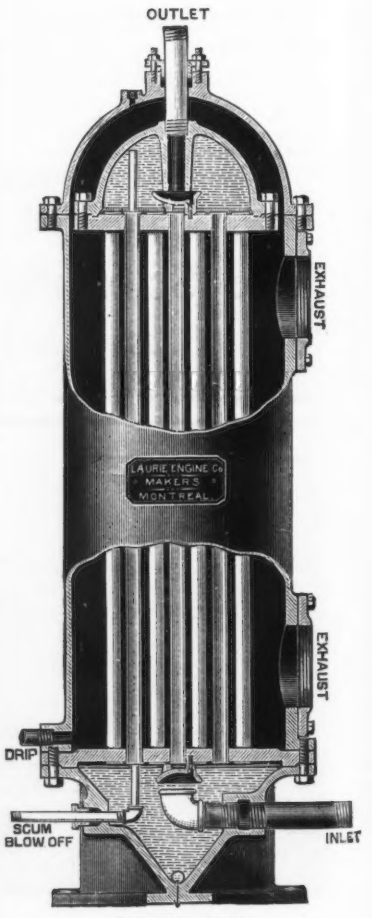

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